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assembly & fastener

ENGINEERING

OCTOBER • 1960




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TRUNNION PIN

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50 YEARS**



assembly & fastener ENGINEERING

October, 1960

Volume 3, Number 10



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• It's still a trick to mass-produce delicate instruments and achieve product reliability. For some interesting techniques used by AC Spark Plug to assemble the Mirromagic speedometer cluster, turn to page 28.



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Letters to the Editor

Cheap Fasteners?

The article on "Cheap Fasteners? Are you Kidding?" in your August issue is a good guide for engineering and purchasing to get "togetherness."

Robert Tennesen
Mechanical Engineer
Admiral Corporation
Chicago, Illinois

Selection of Adhesives

In your August issue there appears Part I of a series entitled "The Selection and Use of Adhesives."

We are greatly interested in this article and wonder if we might obtain two or three reprints, and also if we can make arrangement to receive the same number of this series as they appear.

Jack Baltes, Librarian
Industrial Controller Div.
Square D Company
Milwaukee, Wisconsin

• As soon as reprints of this two-part article are completed, their availability will be announced in our reprint box.

Just a Minute

The mathematical problem in "As Smitty Sees It" in your September issue failed to give the information that only one minute was allowed for each problem. Without this information, any number of answers would be correct; i.e., five correct solutions, eight incorrect solutions.

Robert Cheney
Development Engineer
Consolidated Electrodynamics
Monrovia, California

• Our thanks to you and the other readers who noticed this omission in the problem.

Anniversary Time

Congratulations on starting a new year of publication with your October issue. I enjoy your magazine and still have the October 1958 issue, Volume I, Number 1.

W. F. Murphy
Cost Analysis Engineer
Minneapolis-Honeywell
Minneapolis, Minnesota

One Last Word

We are all facing very new and challenging problems in this "lively age", and I certainly agree with your "One Last Word" in the August issue. It is so very true and you have said it so well.

R. O. Wight
Asst. Sales Manager
Resistance Welder Corp.
Bay City, Michigan

• Mr. Wight refers here to the editorial entitled, "Are You Handicapped by Experience?"

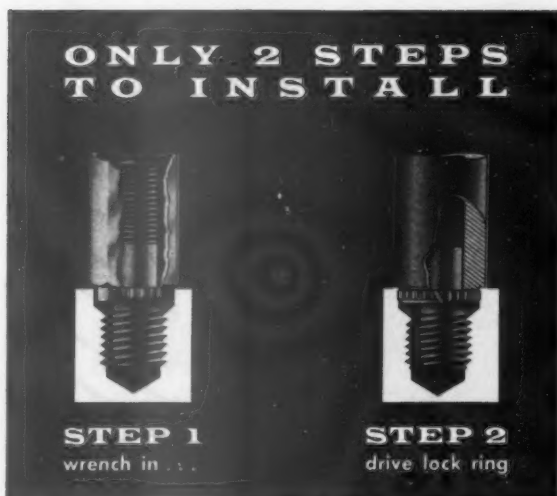
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Well, not *all* of it, but many forward-looking forge plants are taking a fresh look.

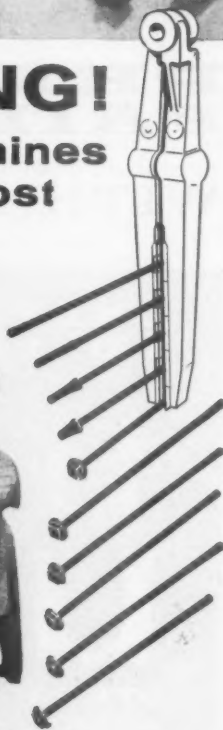
For example, all of the upset-type forgings above were made on National Automatic Tong-Feed Forging Machines. Seven sizes are now proved and presently operating in production: 1", 1½", 2", 3", 4", 6" and 7½".

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Assembly and Fastener Engineering



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the vibration-resistant
LONG-LOK® INSERT!*

Look at that groove! It's P-K's secret weapon against vibration. Filled with Polycap nylon-type polymer, it solves a thousand and one problems where vibration is present... where adjustment is required... where reuse is a factor, over a wide temperature range.

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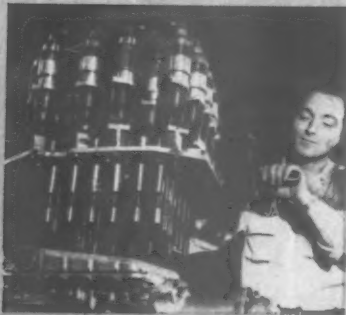


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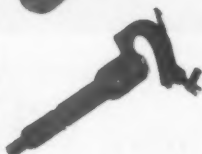
MULTIPLE NUTRUNNERS

Air-operated units custom designed for simultaneous installation of two or more threaded fasteners—with direct drive or "one-shot" torque control clutch—for fasteners from #4 to $\frac{3}{4}$ " diameter.



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Air, hydraulic and air-powered hydraulic models—portable or stationary—for ferrous or non-ferrous, solid or tubular rivets from $\frac{1}{16}$ " to $1\frac{1}{4}$ " diameter.



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Air-operated models for 4 penny to 60 penny straight or threaded shank nails.



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Assembly and Fastener Engineering

THE EDITOR'S VIEW

OCTOBER, 1960, VOL. 3, NO. 10

IT'S TIME TO VOTE PROTECTION FROM OURSELVES



During the month of October, aspirants to elected government offices, both national and local, will continue to deluge us with campaign promises. They will have just the prescription to prevent business recessions. They will have just the solution for reducing the growing surpluses in our granaries. They will promise remedies for virtually every economic and social ailment.

And such promises are all a part of the game of campaigning for public offices. Candidates long ago learned the value of appealing to the emotions of the public.

Certainly those promises involving hand-outs from the pork barrel should be taken with many grains of salt. But they are most appealing for aren't we all just a bit greedy? Sure, we know that every dollar from the government till must eventually be paid back manyfold in taxes. But that is for tomorrow to worry about.

Sure we hate the thought of creeping welfarism and paternalism in government, but how many of us are willing to turn thumbs down to a hand-out? Virtually no one is immune to the temptation of getting something for nothing. It's a disease which

affects almost everyone, rich and poor alike, but to a different degree. And each person has his own interpretation of what constitutes welfare.

What you accept from the government is a dole, but what I accept is justly-earned economic assistance. You went to a trade school on a government appropriation, but I went to college on the bill of rights. Your company is solvent because of government price supports in your industry, but mine is prospering because of our important role in missile and space work. Your community got a big defense plant because of political pull, but mine got one because of the many deserving people in our city. Really now, isn't this the way a lot of us think?

So, it's time for some soul-searching when we go to the polls in November. There certainly are economy-minded candidates in both parties with the courage to buck the trend to more and bigger government giveaways. And though it may go against our grain, it's time we started electing such officials so that we in turn may be saved from our greedy selves.

Matt E. Skeritz

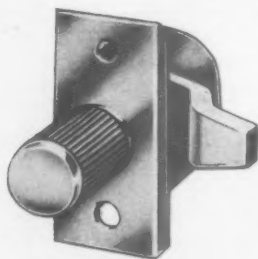
Managing Editor

FOR A TIGHT CLOSURE
OR TO COMPRESS A GASKET

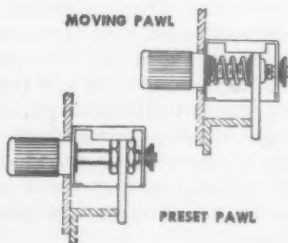
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Adjustable Pawl FASTENERS

1/4 turn closes—additional turning tightens



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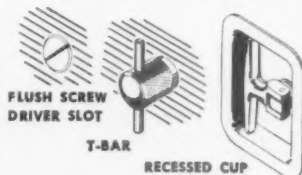


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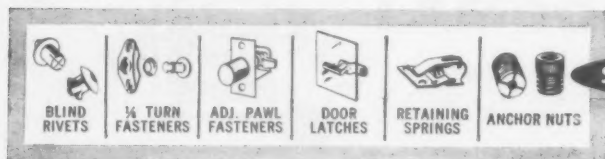


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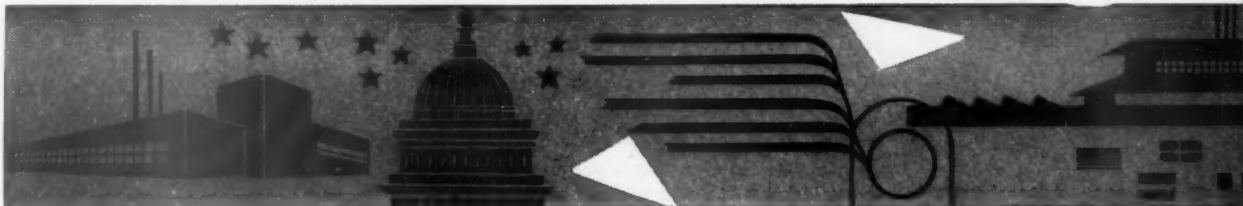
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The State of Business



WHAT IS THE INVESTMENT CLIMATE?

by **Merrill Lynch, Pierce,
Fenner & Smith, Inc.**

One positive development stands out among the many uncertainties facing business and the securities markets. That is the recent actions of the Federal Reserve Board in the direction of easier credit conditions. The lower cost and greater availability of money coupled with lower margin requirements should sooner or later be reflected in an improvement in business and higher prices for stocks.

The cut in margin requirements was of course a very modest step, and a further reduction to perhaps 50% could occur if trading stays at a relatively low level. Certainly this reduction by itself should scarcely have much effect on the trend of stock prices.

September and October are often critical months for the stock market. They are also months which business forecasters watch carefully for signs of change. If business can rise above the plateau on which it has rested all year, the stock market could

well give a good account of itself. Actually, the level of business has been disappointing this year mainly when measured against the very optimistic expectations which were widely published at the beginning of the year.

For the year as a whole earnings estimates have been scaled down considerably—company by company. For example, 1960 earnings on the 30 stocks which make up the Dow Jones Industrial average were projected at the beginning of this year at \$42 a share. Latest revisions put the probable figure at \$37. To keep things in perspective, however, we should note that even \$37—if attained—will set a new all-time high record.

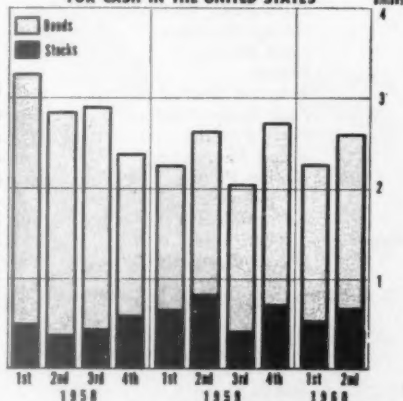
The decline in stock prices coupled with moderately higher earnings has resulted in a reduction in price earnings ratios from approximately 21 times registered in May of 1959 to about 16 times currently. Sixteen is, of course, still a relatively high figure when viewed over many past years.

In recent weeks we have also witnessed a narrowing of the gap between yields on corporate bonds and industrial stocks. Despite this closing of the gap, fixed income securities are still more attractive for income purposes. Whether this gap will close completely will depend on how good business is over the latter months of this year. As always, new bond offerings provide somewhat higher rates than outstanding obligations and should be considered by investors seeking income. We believe that price risks are limited in the light of current money market trends.

Interest rates, which hit their post-war peak at the beginning of 1960, have been in a downtrend ever since then but the pace has been accelerated since early June when the Federal Reserve took its initial action toward easier money conditions. Bonds have appreciated across the board but Treasury issues have enjoyed the greatest rise and as a result the spread between yields on corporate bonds and Treasury obligations has widened. Unless business picks up substantially, generally firm bond prices are in

continued

**NEW CORPORATE SECURITIES OFFERED
FOR CASH IN THE UNITED STATES**



Issues in the second quarter of 1960 about matched those of the same period in 1959, with increased bond offerings offsetting a decline in stock issues. Both were below the second quarter of 1958.

Source: Securities and Exchange Commission
First Nat'l Bank of Chgo.



DOWEL PIN

check list

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1 PRECISION Hardened and ground to .0002" or .001" over nominal diameter. Also available: oversized .002", .003", .004", .005".

2 HARDENED Case hardened to 60-62 Rockwell "C" scale.

3 SIZES 132 standard, 3/8" to 6" lengths, 1/4" to 1" diameters. Special on request.

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State of Business, continued

prospect for the period immediately ahead. Treasury financing should be less unsettling to the bond market than it was in the latter part of 1959 when a large Federal deficit was being financed.

The stock market, as often, is a mixed and selective affair. While the Merrill Lynch index of 540 stocks declined about 6% to August 1960, some groups such as the aluminums, automobiles, rubbers and airlines did much worse with declines ranging from 20-to-30% while the office equipment, cigarette, recreation, and some foods reported gains of 10-30%.

Even the group averages tell only part of the story. Among the drugs, for example, G. D. Searle and Merck showed gains of 10-to-15% while Smith Kline & French and Carter Products went down over 10%. In the electrical equipment group advances of 8 and 17% by IT & T and Emerson Elec-

tric were offset by declines by two large appliance firms. These examples point up the importance of selectivity.

While some stocks in the more glamorous categories are still selling at what appear to be rather fancy prices in relation to current earnings or near term prospects, it is interesting to point out that at the moment there are over 200 stocks listed on the NYSE which are selling at less than ten times actual 1959 earnings and almost 100 companies selling at less than ten times estimated 1960 earnings.

In our opinion, carefully selected common stocks may be purchased at this time—some for income and others for capital appreciation. Also, as previously stated, we feel that the bond market is in a buying range for income-minded investors and particularly municipals for investors in high tax brackets.

LATEST INDUSTRY STOCK RATINGS BY MERRILL LYNCH

Relatively Favorable

Airlines
Biscuits
Cigarettes
Dairy
Fire-Casualty Ins.

General Motors
IBM
Natural Gas—
Integrated Systems
Natural Gas—Pipelines

Paper Makers
Railroad Equipment—
Car Leasing Cos.
Small Loan
Steel

Average

Agricultural Machinery
Air Conditioning
Aircraft Manufacturers
Aluminum
American Motors
Apparel Chains
Auto Finance
Automobile Accessories
Banks
Beer
Bread Baking
Candy
Canning
Carpets
Cement
Chemicals
Chewing Gum
Chrysler
Cigars
Coal (Bituminous)
Construction Machinery
Containers—Glass
Containers—Metal
Copper

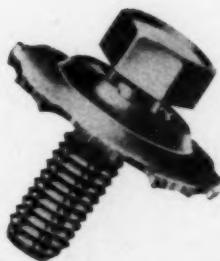
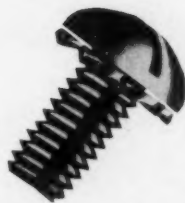
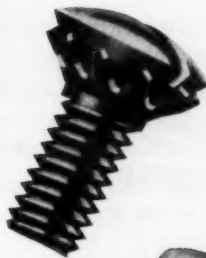
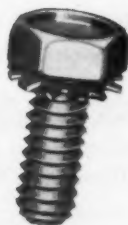
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Cosmetics
Department Stores
Drug Chains
Drugs
Electronics
Fertilizer
Food Chains
Ford
Hard Floor Coverings
Heavy Machinery
Lead & Zinc
Liquor
Machine Tools
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Meat Packing
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Manufacturers
Railroads
Recreation
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Rubber
Snuff
Soap
Soft Drinks
Studebaker-Packard
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Beet Sugar Processors
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Textiles
Truck Manufacturers
Utilities
Vegetable Oil

Relatively Unfavorable

Electrical Equipment
Oil Field Equipment

Rayon
Variety Chains



SEMS

These efficient screw-and-lockwasher assemblies are successfully used for cost-saving in thousands of manufacturing plants. Many are made by ELCO — because ELCO has the equipment, and the experienced people, to make them well. Illustrated here are a couple of standards — and a number of "specials", designed and tooled by ELCO to suit unusual and specific requirements. *Buy your standard SEMS from ELCO — let ELCO design your special SEMS.*

SEMS

ELCO TOOL AND **SCREW CORPORATION**
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WIRE FOR SUDDEN SERVICE ON SOUTHERN FASTENERS

The wire you see in this photograph will make nearly a million machine screws. Yet the rolls of USA-made wire shown here are only a very very small portion of the enormous stock carried in Southern Screw's modern six-acre plant in Statesville, North Carolina. All this stock and all this space mean that Southern's manpower, machines and materials are ready to give "sudden service" to your order regardless of its size.

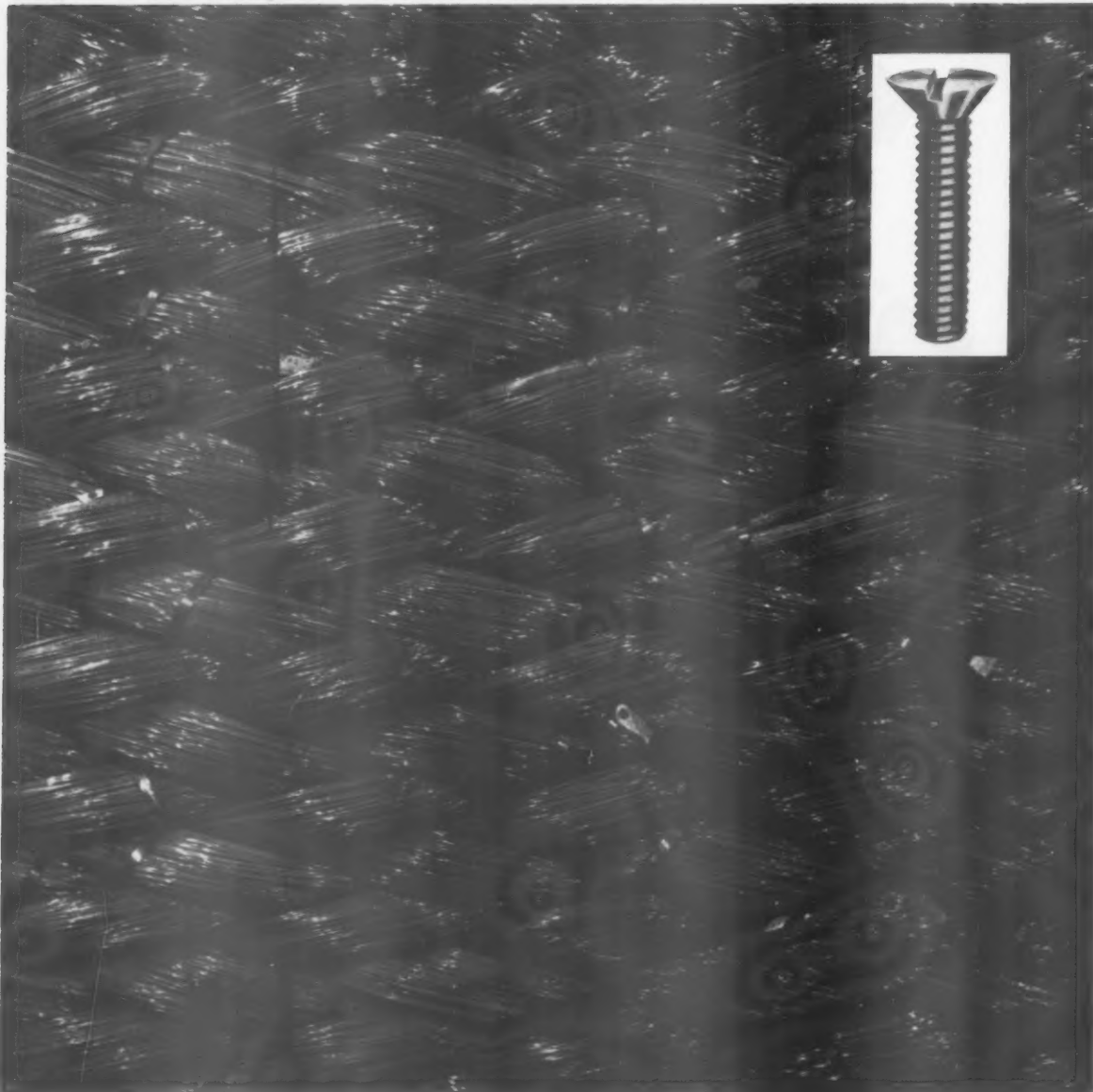
Southern specializes in fasteners — makes nothing else. This is your guarantee that your fastener problems are Southern's only interest.

If you want sudden service on quality fasteners, plated or plain, Phillips or slotted, standards or specials, get in touch with the Southern Screw distributor, or wire, phone or write to Southern Screw Company, Telephone: TRIangle 3-7213, Statesville, North Carolina.

Manufacturing and Main Stock in Statesville, North Carolina. Warehouses: New York • Chicago • Dallas • Los Angeles.



Machine Screws and Nuts • Tapping Screws • Stove Bolts • Drive Screws • Carriage Bolts • Continuous Threaded Studs • Wood Screws



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Industry at Work



LIBRASCOPE DESIGNS "UNIVERSAL" CIRCUIT CARDS TO SPEED PRODUCTION

A "universal" printed circuit card which can be prefabricated and adapted to different circuit requirements has been developed by Librascope, Inc.

On the stock cards, components may be added to form logic modules before the final design of the computer is ready, and then, when the design is firmed, these modules may be interconnected to form the required circuit.

Such a technique is particularly adaptable to short run and prototype production, where lead time between design and actual start of production is usually excessive.

A good example of the use of this new technique is in the prefabrication of the four huge data processing central computers Librascope recently completed for the Federal Aviation Agency's air traffic control program. Each computer card is capable of taking 33 individual modules, and inter-connection was made after the final computer design was firmed.

In producing the cards for the various types of computers built at the Glendale plant, assembly is divided into two steps. The first part is pre-assembly, at which point all cards destined for a specific class of computer look alike.

This stage takes place before the logical design of the computer has been completely firmed by the engineering department. This permits much fabrication prior to full production.

The second phase of assembly involves working out the interconnections of the individual modules to provide the proper circuit for the computer. This is done after the computer design has been completed.

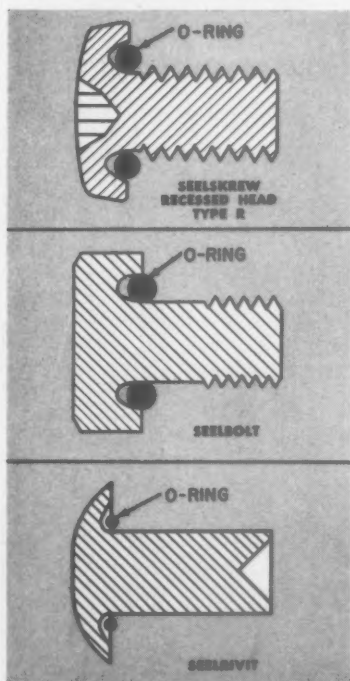
The technique was developed to speed production of extremely short run equipment, and does not result in the most compact packaging, or in a card that is particularly adaptable to mass production, according to Lewis W. Imm, president. But where a

continued



Assembler soldering components on a new printed circuit card containing a universal etched pattern. It can be modified by interconnections to form any circuit function.

SEELSKREWS* SEELBOLTS* SEELRIVITS* *High Pressure Self-Sealing FASTENERS*



- Removable and static self-sealing screws, bolts and rivets.
- These industrial fasteners meet all applicable military specifications.

SEND FOR CATALOG 359-A-18 describing items above, also seals for switches, shafts, circuit breakers, indicator lights and other electronic components.

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HIGH PRESSURE STATIC AND MOVABLE SEALS
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Industry at Work, continued

single unit, or less than five machines are being built, savings in production time and reduction in the lag between design and assembly makes this technique highly desirable.

Another innovation in the card is that the etched circuitry is carried through from the base plug of each card to the top of the card where a duplicate connector is provided. This permits the card to be connected to a test instrument while it is plugged into the computer.

58-STATION TRANSFER UNIT: FIRST STANDARDIZED SPECIAL

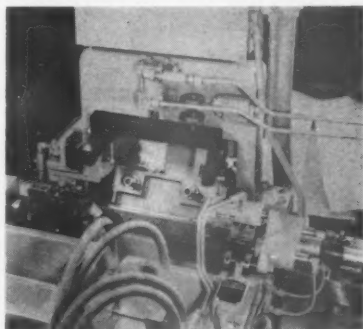
The first major piece of equipment to be built to the new Special Machine Tool Standards, has been delivered to its owner—American Motors Corporation.

Dubbed "Buhr's Baby", the machine is a lift-and-carry, part-through transfer machine with 58 stations. It was designed by Buhr Machine Tool Co., Detroit, to perform 323 operations in automatic sequence on cylinder heads for 1961 automobiles at American Motors.

Operations, in addition to rough and finish machining, include probing, sealer application, assembling, pressure testing, rejecting and injecting. With work cycle of 30 seconds, capacity at 100% efficiency is 20 pieces per hour.

In its progress through the machine, the part is rotated through

In order to facilitate checking, circuitry used in a computer such as an FAA data processing central restores signals at each gating point throughout the machine to eliminate signal degeneration. Since all connections are available at the top of the cards, an auxiliary maintenance panel can be plugged in and troubles can be diagnosed without the necessity for circuit crawling with an oscilloscope. Testing and checkout time during final inspection is reduced.

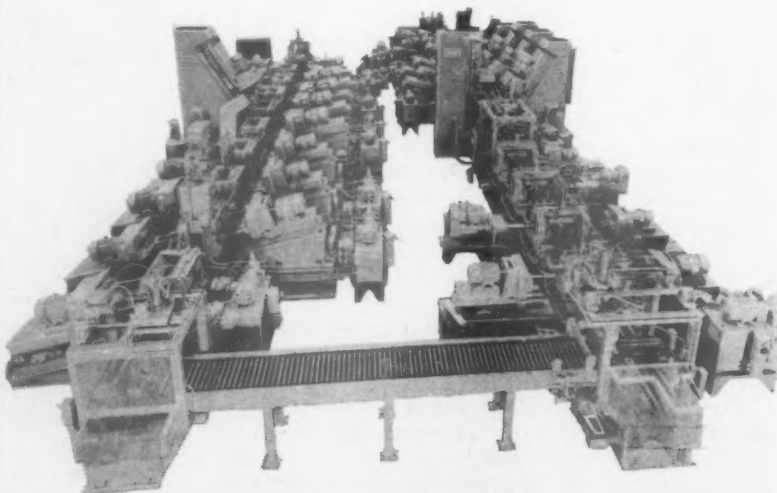


At assembly station 18-A, mechanism (right) dispenses sealant, shuttle (upper left) is fed a plug which it places on anvil for pressing into workpiece.

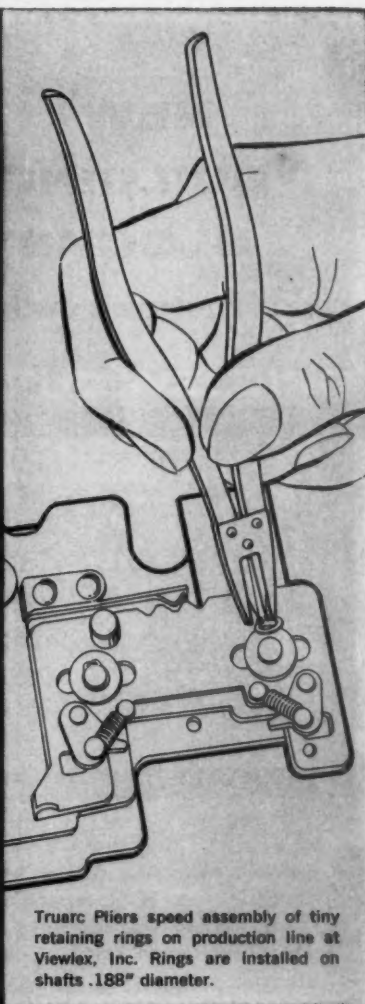
90° twice and tipped 90° four different times to present appropriate faces to the tooling.

At assembly station No. 18-A, a circular plug is inserted in hole at one end of the head, a mecha-

continued



A lift and carry type transfer performs 323 operations on a six-cylinder auto cylinder head.



Truarc Pliers speed assembly of tiny retaining rings on production line at Viewlex, Inc. Rings are installed on shafts .188" diameter.

Truarc rings eliminate rejects, cut assembly time 40%

Production engineers at Viewlex, Inc., Long Island City, N. Y., save time, speed work with Waldes Truarc retaining rings.

On Viewlex Instruct-O-Matic automatic slide projector, the top plate assembly utilizes five Truarc Series 5100-18 external rings to secure the lost motion plate to the base.

Operator above uses Truarc Standard Plier No. 0018 for installation and removal of rings in accurately located grooves, pre-cut before the assembly is made. Precision engineered plier tips grasp tiny rings securely to speed assembly and disassembly. Pliers are pre-set to avoid over-spreading the rings.

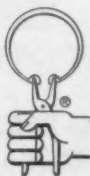
The original design of the unit called for shoulder rivets. In addition to requiring a longer stud, the rivets were difficult to control for height consistency. As a result, when the rivets were flattened, binding or looseness between the plates often caused expensive rejects. For maintenance of the unit, it was necessary to scrap the entire assembly.

Use of Truarc rings assures precise seating of the plates and eliminates rejects caused by faulty riveting. Result: an assembly time saving of 40% at Viewlex. Use of Truarc rings may achieve similar or greater savings—in labor, machining or parts—on your production lines. These versatile fasteners

come in 50 functionally different types, as many as 97 sizes within a type, 6 metals, 13 finishes.

They replace nuts and bolts, machined shoulders, threaded collars and set screws, bowed washers or springs and cotter pins, and other fasteners and fastening operations. (A wide line of semi-automatic and manual Truarc tools are available to speed ring assembly). For facts on the entire line of rings, tools and application ideas, write for the new Waldes Truarc catalogs: RR 10-58 and AT 10-58. Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N. Y.

9-16



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TRUARC®
RETAINING RINGS**

Waldes Kohinoor, Inc., Long Island City 1, N. Y.

TRUARC RETAINING RINGS...THE ENGINEERED FASTENING METHOD FOR REDUCING MATERIAL, MACHINING AND ASSEMBLY COSTS

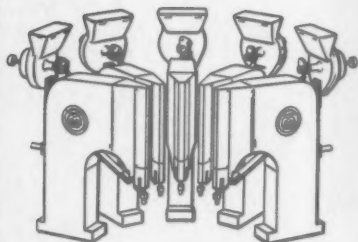
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October, 1960

17

NEW
"BUILDING
BLOCKS"
... for automatic riveting



The narrow wedge shape of Milford's new air-actuated riveters permits unusually close riveting. Both models can be combined with sliding-fixtures, indexing tables or similar attachments to give greatest flexibility of assembly. Air-operated toggle action assures fast and safe action. Model 56 handles tubular rivets from $\frac{3}{8}$ " diameter x $\frac{5}{8}$ " length; Model 57 from $\frac{3}{16}$ " diameter x $3\frac{1}{4}$ " length.

Group these new "Building Blocks" to suit your own production needs. Use them singly, in pairs, in threes, fours or even fives. Multiple riveting is the newest answer to reducing production costs.

For more new ideas, tips and technical data on tubular rivets and rivet-setting machines, ask your Milford Representative for a look at Milford's new **MANUAL OF MODERN RIVETING PRACTICE**.



MILFORD RIVET & MACHINE CO.

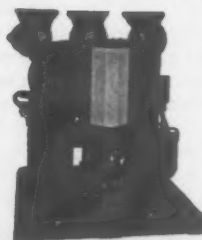
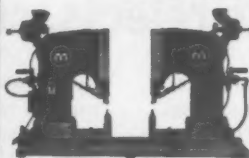
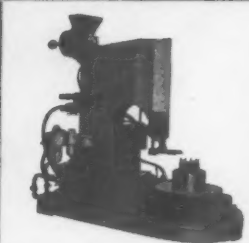
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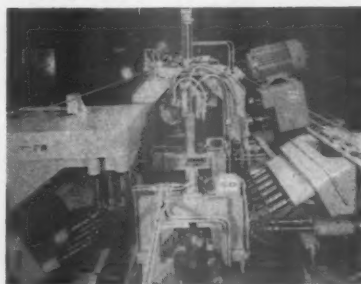
Model 56



*Milford's Models
56 and 57 offer
unlimited
flexibility in
automatic assembly*



Industry Work, continued



Tapping heads at station 50. Note sets of tools in heads at both obtuse and acute angles.

nism first dispenses and evenly distributes sealant around I.D. of opening while head is in previous station. Then a small, open top shuttle is automatically loaded with a plug from a floor type feeder. The shuttle moves out across line, placing the plug on an anvil. The workpiece moves into position in station and a C-clamp closes on the head, causing the anvil to press the plug into a hole.

STUDY RADIATION PATTERNS FROM B-52G ANTENNAS



A scale model of a B-52G missile bomber is being used to measure radiation patterns given off by the aircraft's antennas. The test is part of the study and research work being done by the antenna and micro-wave systems laboratory at Boeing Wichita.

The scale model of the intercontinental bomber is suspended in free space by a special, 10-foot supporting tower made of a dielectric material which will not affect the aircraft's radiated signals. This tower is in turn supported by a rail-mounted platform which is operated from the control building in the background. The model can be rotated around two axes as signals are transmitted; thus complete three-dimensional antenna coverage can be obtained.

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Assembly and Fastener Engineering

STOP COSTLY DRILLING...TAPPING...HAND WELDING — SWITCH TO NELSON STUD WELDING

With a NELWELD® portable or multi-gun unit, fastener studs can be end-welded to steel or aluminum at a rate that will lower your labor and production costs. With NELWELD on your production line, **product weight can be reduced...design may be simplified...skilled labor may be released for other jobs.** Complete fusion of stud and base plate assures a rugged, secure attachment. Your products come off the line on schedule...at lower cost. Write today for 12-page folder "Reversing the Trend in Production Costs".

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Division of GREGORY INDUSTRIES, INC.

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Cuts assembly time
in half with...

NEW ROTOR J-40S IMPACT WRENCH

JOB: Driving $\frac{3}{8}$ " bolts to attach cover and insulators on distribution transformers. Formerly used ratchet hand wrench... fatiguing to the operator... a bottleneck.

RESULTS: New Rotor J-40S Air-Powered Impact Wrench (with special extension drive to clear insulators) does the work in less than half of former time. Bolt tightness is uniform. Operator fatigue is eliminated.

Ask for demonstration of Rotor portable tools to see how they can cut *your* costs! Write for a free copy of Bulletin 53B.

◀ Courtesy Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pennsylvania.

HAVE YOURS? 100-page handbook for portable air tool users. Request on your letterhead.

HOW TO CHOOSE
AND USE
PORTABLE AIR TOOLS



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Rotor High-Cycle Electric Tools: Grinders • Polishers • Sanders

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TOOLS**
CLEVELAND, OHIO

Assembly and Fastening Ideas



Standard parts and cases make it possible to vary basic circuitry without changing packaging.

DESIGN LOCKSET WITH NYLON MECHANISM

A major innovation in hardware—a lockset with nylon mechanism—has been developed by Lockwood Hardware Manufacturing Company of Fitchburg, Mass.

The new locksets use Du Pont's Zytel nylon resin for all major internal parts. The result is a durable and ingeniously simple mechanism. The molded nylon parts provide resilience and low-friction, nylon providing quiet operation and eliminating the need for lubrication. Tests showed that after 1,200,000 cycles, equivalent to at least 80 years of use, the unlubricated locksets operated even more smoothly than when new.

Quick installation is a major feature of the locksets. One advantage is a self-aligning latch case, which enables the installer to swivel the latch to

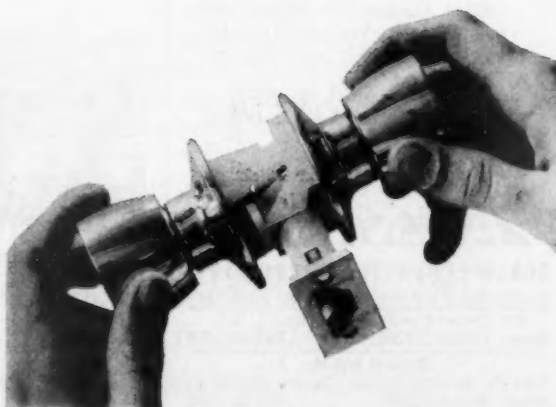
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STANDARD PARTS AID AMPLIFIER ASSEMBLY

Librascope Division-General Precision, Inc., reports that assembly of complex sub-assemblies has been accelerated by use of "common" parts.

In producing servo amplifiers for the larger number of data processing devices the Glendale, Calif. division builds, standard parts have been adopted for frame and chassis elements. Even though a wide variety of amplifiers are made, each one is assembled on standard base plates. These have been carefully designed to accommodate all of the various modifications found from unit to unit.

Use of the standard base size for all modules permits the industrial engineers to plan assembly, work space and parts flow before actual production starts. The use of standard modules also simplifies wire and installation of the sub-assemblies in the system.



Round and square chassis sleeves mate with matching grooves, avoiding accidental misassembly.



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(precision tolerance)

- Stainless steel 18-8, type 303
- Diams: .0312 through .500
- Lengths: 3/32" through 2 1/2"
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- "Specials" manufactured promptly
- Full range raw material on hand

TAPER PINS

(commercial, precision, AN)

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PLUS all types and sizes of screws (slotted, Phillips—both magnetic and non-magnetic—hex, socket), bolts, nuts, washers, rivets, nails, keys, etc.

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Assembly and Fastening Ideas, continued

the right or left of the central lock assembly in order to compensate for bevel-edged doors or for improper boring.

Accidental misassembly is impossible. The inside and outside chassis units are designed with round and square sleeves which mate with round and square grooves, and the entire set is held by two double-lead through-bolts which drive directly into tap-holes

in the chassis sleeves. Threads cut into the sleeves of nylon resin cannot strip under normal installation conditions.

In-service features include automatic compensation for door shrinkage—a function of the natural elasticity of Zytel which keeps the central lock assembly under tension. This elasticity also virtually eliminates possibility of the through-bolts backing out.

CONVEYOR SYSTEM SOLVES ASSEMBLY WORK SPACE PROBLEM

An intricate power and free overhead conveyor system has solved an in-process storage problem that knotted materials handling at I-T-E Circuit Breaker Company, Philadelphia.

I-T-E needed a system which would permit storage of circuit breakers between work stations during assembly, and which could be operator-controlled. Assembly area floor space was limited.

An 800 foot power and free overhead Chainveyor system proved to be the answer. Parts handling in the assembly area is now simplified. Adjacent to the power part of the system is a second track exactly the same size as the power track, accommodating free trolley assemblies. The motivating power line moves carriers from one area to another, while the related free system, on which the carriers actually move, is used for switching and in-process storage.

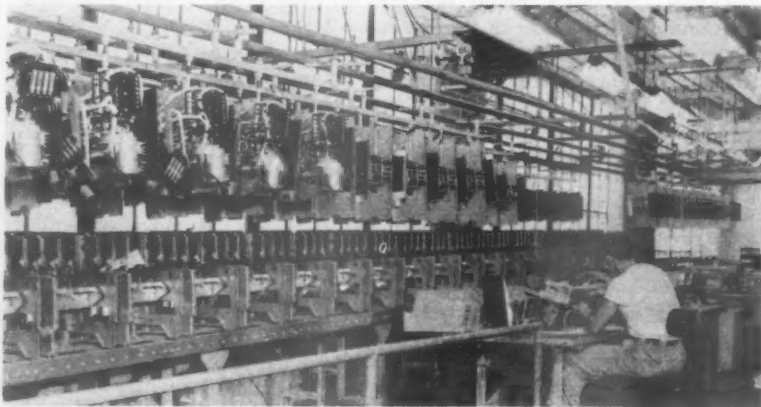
Eight separate gravity storage lines, controlled electrically from



In-process parts are fed into free gravity lines for temporary storage.

push-button panel, carry sub-assemblies through work stations to permanent storage. These free lines were designed with escape-stop stops on 10 foot centers, which are opened each time a drive dog on the adjacent powered lines passes. Free travel is thereby safely controlled to 10 foot stop-and-go movement.

At the load station, a worker places two partially assembled circuit breakers (total load weight, 50-60 lbs.) on a 30" carrier. The operator at the push-button control station then directs the loaded carrier into any one of the eight open gravity lines.



Partially assembled circuit breakers are banked in in-process overhead storage on "free" gravity conveyors before inspection.



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Of course, Garrett maintains complete stocks and sizes of many variations of flat nuts, "J" nuts, "U"—in both cone and twin-prong impressions — as well as round and rectangular push-on nuts for immediate delivery.

Garrett offers complete facilities, and exercises strict quality control in every manufacturing operation of spring fasteners . . . from stamping to heat treating through plating or finishing, including Garrettizing, our own new mechanical impact method of zinc plating without hydrogen embrittlement.

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These two RIVNUTS® permitted redesign to eliminate parts; speed assembly

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Before RIVNUTS, the electrodes and terminals were fastened to a large porcelain "dish" by screws and nuts. Four gaskets were required to prevent water leakage. A metal screw-on cap had to be fitted underneath the porcelain "dish".

RIVNUTS eliminate all these cumbersome pieces. Installed in the simplified plastic base, RIVNUTS secure terminals, provide water-tight nut plates. Two screws attach electrodes—and the unit is complete.

You can get B.F. Goodrich RIVNUTS in thread sizes 4-40 to 1/2"-13 with flat or counter-sunk heads. Rivnuts have hundreds of applications in appliances, electronic equipment, machinery and structures. Special types are available for aircraft and missiles.

Write now for free copy of Rivnut Design Data. Better yet, send us a sketch of your toughest fastening problem. Dept. AE-10, B.F. Goodrich Aviation Products, a division of The B.F. Goodrich Company, Akron, Ohio.



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REPORTS FROM THE FIELD



HOW 300 FOOTCANDLE LIGHTING, CONTROLLED ASSEMBLY CUT METER REJECTS

Carefully controlled environment, featuring a lighting level of 300 footcandles, has boosted quality levels 100%, output 50%, and cut assembly costs 20%, ac-



High output fluorescent lamps are used in luminous ceiling.

cording to Paul P. Radecky, supervisor of production for Hickok Electric Instrument Company in Cleveland.

Typical of the improvement is the case of one delicate meter produced under former uncontrolled environmental conditions and lighting levels of a little over 100 footcandles. The meter failed

to pass rigid quality tests in spite of careful inspection. Taken into the new assembly room, inspectors easily located the trouble—a small human hair had fallen into the mechanism. Similar incidents have been virtually eliminated, sharply reducing rejects.

Hickok workers thus wear special dust free garments. Before entering the assembly area they brush their clothing with magnetic brooms; they wipe their feet on two separate special magnetic floor mats. Inside, they work in an atmosphere that has dust removed electronically.

The room itself is pressurized at a constant level. With 4 psi higher room pressure than surrounding areas, dust is kept from entering windows and doors, temperature is held at constant 75°F and humidity is held constant at 45%.

From the luminous ceiling pours the light of 300 well diffused footcandles to the modern, desk-like assembly line. The eye loupes formerly required, now need to be used only for final



Assembly of delicate air instruments is now done without use of magnifying loupes, thanks to a 200 footcandle increase in lighting.

visual checks of the tiny assemblies.

Continuous rows of 2-lamp eight-foot cool white General Electric lamps are used behind the vinyl plastic ceiling. The area is approximately 30' by 50' with a 10' ceiling. The reflectances are 70% walls, 20% bench tops, and 10% floors.

Hickok's "White Room" has proved so successful that the company is putting into operation a similar 6000 sq. ft. facility at its plant in Greenwood, Mississippi.

"GROW" ELECTRONIC PARTS TO AVOID MANUAL ASSEMBLY

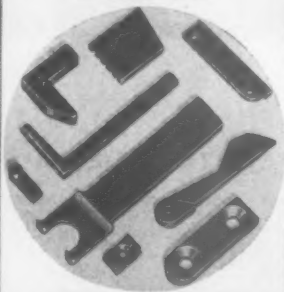
Scientists of the International Business Machines Corporation demonstrated how they can "grow" electronic components with a new technique of arranging atoms of one material on another—a kind of "atomic bricklaying". They expect the new process will be used to produce functional circuit building blocks for future high-speed computers. It could eliminate the need for manual assembly of devices and arrays.

The new fabrication process, called vapor growth, is a major advance in solid-state technology. It has been used already by IBM to produce a variety of experimental semiconductor devices, including Esaki tunnel diodes and transistors. It does this in one continuous operation. In conventional semiconductor device fabrication, many separate operations are required to form the active parts of

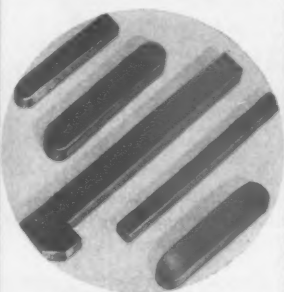
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Field Reports, continued

the device. The vapor growth process makes practical for the first time a special type of growth—epitaxial—of a layer of one semiconductor on another, such as germanium on gallium arsenide. This means the top layer automatically duplicates the same crystal structure as the one beneath it.

ULTRASONIC IRON SOLDERS WITHOUT FLUX

A new eight-ounce 10-watt ultrasonic soldering iron will solder a wide range of materials without flux, announced Bernard Herman, general manager, Vibro-Ceramics Division, Gulton Industries, Inc., Metuchen, N.J.

The iron is designed for soldering semiconductor materials as well as metals such as aluminum, magnesium and their alloys, especially those characterized by very rapid surface oxidation. The new unit completely eliminates surface pre-treatment as well as post-cleaning to remove flux.

In the process, semiconductor iodide vapor picks up semiconductor material at a high temperature from one end of a glass tube. This vapor then moves toward a cooler part of the tube where the semiconductor "grows" from the vapor onto a suitable single crystal seed. It is then possible to fabricate the actual device on the seed.

"The combined high efficiency of the unit's Glennite Hi-Temp Ceramic Transducer and the mechanical horn overcomes the serious problem of surface oxidation encountered in conventional soldering of materials such as aluminum and magnesium," according to Herman.

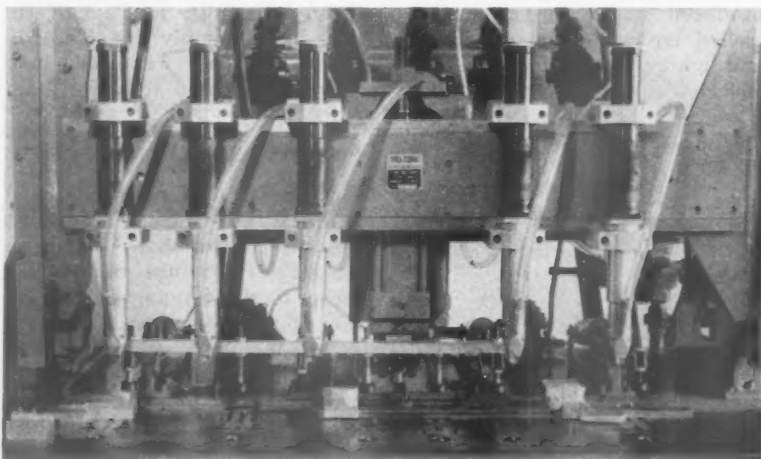
He points out that "oxide films are removed by the ultrasonically activated tip, and the molten solder then forms an intimate bond with the surface of the metal without the use of flux." It operates on 115V, 60-cycle power.

5 SPINDLE SCREWDRIVER SPEEDS WINDOW HINGE FASTENING

A five-spindle automatic screw-driving machine is speeding the fastening of hinges into window jambs. The Clyde Engineering Tru-Tork feeds five screws from one hopper to five air drivers. Adjustable for center distances, the drivers are mounted on a rail with quick acting clamps for adjustments.

Installed underneath the table are six Spotnailers which drive

1½" long nails into the window frame. In the sequence of operation, the window frame and hinge are placed in position. The operator presses a button to air clamp the part, then actuates the cycle button that operates screwdriver heads and Spotnailers simultaneously. Sliding stops and movable drivers permit assembling five different lengths, both right and left hand, of hinges to window frame.



Cycle time is three seconds on this automatic five-spindle screwdriving and naildriving machine.

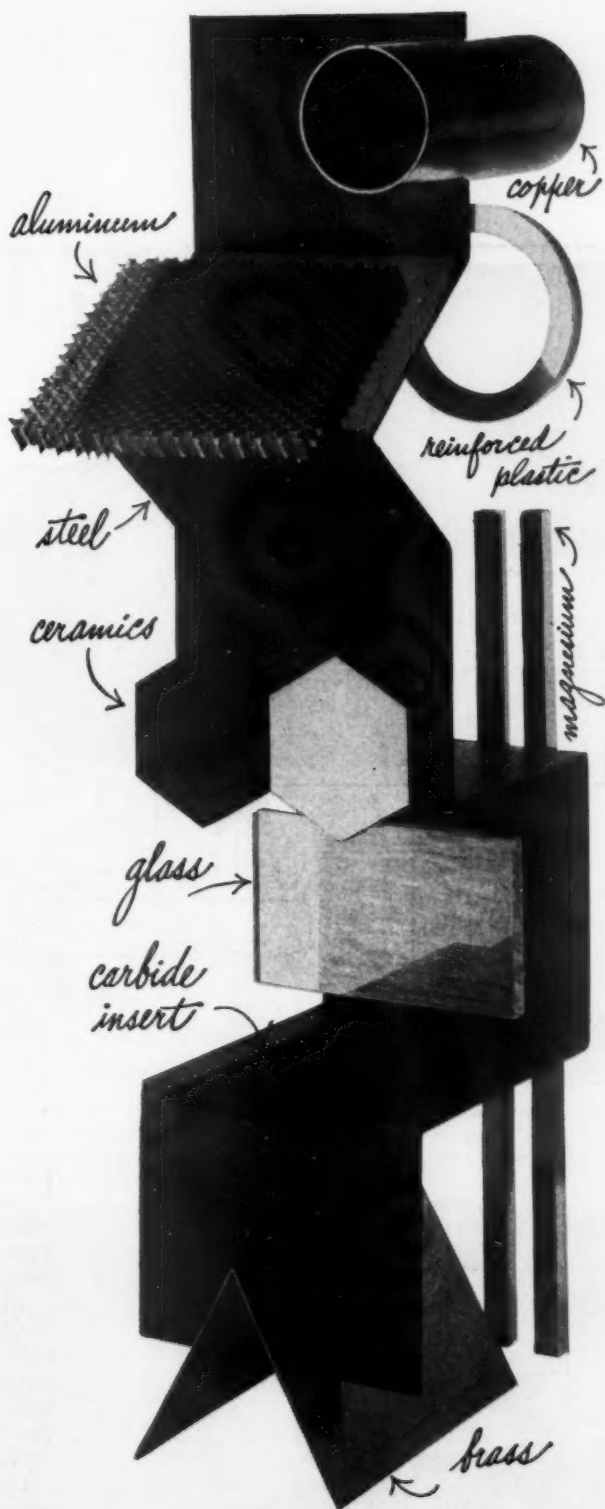
WHAT DO YOU WANT TO BOND TO WHAT?

Take a structural material—for instance, any of the materials shown to the right. Want to join it to itself or another material? Then chances are that SCOTCH-WELD® Brand Structural Adhesives are your best fabricating answer. This modern high strength method of joining materials permits improved design and production techniques . . . cuts costs . . . offers unique benefits.

For example: Smoother contours result when mechanical fasteners are eliminated. Fabricating complex shapes—often impossible or too expensive with ordinary fastenings—is made easy and economical with SCOTCH-WELD Adhesives. In fact, costly complex castings can often be replaced by two or more inexpensive simple castings bonded together with SCOTCH-WELD Adhesives. And lighter gage materials may be used where desired, since stress is spread over a wide area. Often, too, inspection and production steps can be eliminated. Another benefit—unusual combinations of materials which can be joined in no other way can be bonded perfectly with SCOTCH-WELD Adhesives.

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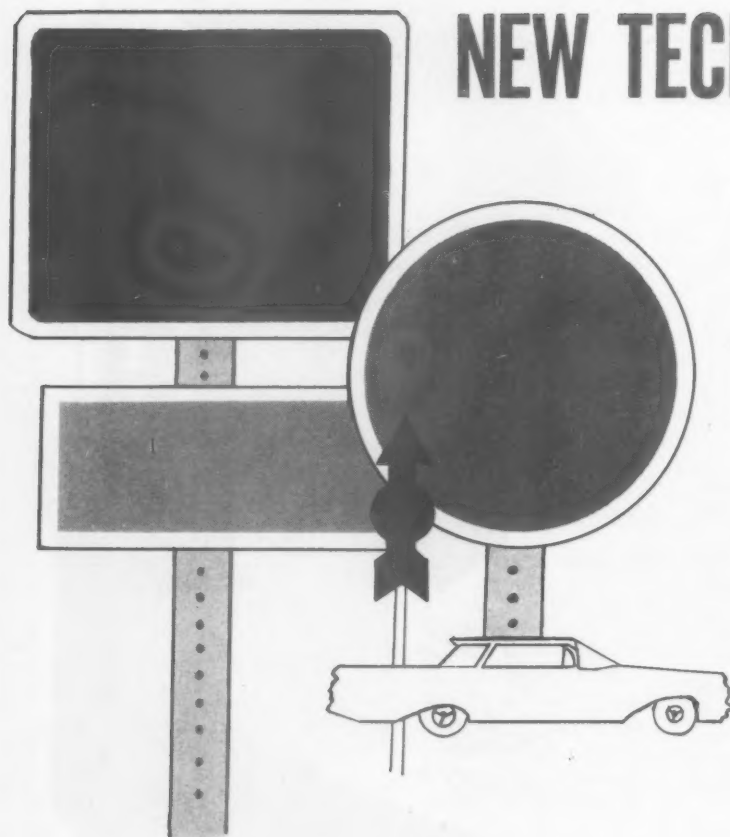
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NEW TECHNIQUES SPEED

It's still a trick to mass produce delicate instruments and achieve product reliability. Here's how AC Spark Plug uses conveyor lines, power tools, automated fixtures and printed circuitry to assemble the Mirromagic cluster.



by Herbert Chase, M.E.

Instrument clusters for modern American passenger cars are complex products. Components are many and delicate. The final product must operate precisely and dependably over long periods, resisting vibration and other stress factors. This kind of performance demands exacting care in design and assembly.

A manufacturer of such clusters is the AC Spark Plug Division of General Motors. In their Flint, Mich. facility, components and assemblies of this type are designed and built in close cooperation with many automotive companies. The completed units are delivered ready for installation in instrument panels.

One of the latest designs in this field is the Buick Mirromagic cluster, so called because the instrument dials are seen as reflected images in a mirror pivoted about a horizontal axis. This mirror can be set at different angles by the car operator to suit his own eye level. Scale numerals are printed in reverse, as images must appear if seen without reflection.

Because assembly of the Mirromagic clusters must be

ASSEMBLY OF BUICK SPEEDOMETER

done economically and expeditiously on a large scale, all operations are performed on automated lines and conveyors. These are employed to supply major components, to advance assemblies in process and to move completed assemblies to packing points. To avoid a single line of excessive length, the major line is divided into two loops connected by a conveyor. Final assemblies are conveyed to a final test line before delivery to a packing area.

Numerous labor saving devices expedite assembly. And, when operations are not performed to advantage on conveyors, such work is done on stands or benches or in fixtures. These are arranged so that movement to and from conveyors is short, convenient and involves minimum lifting. As scores of operations are required to assemble the total instrument panel, those pictured and described in detail here relate only to the Mirromagic cluster and its components.

Work on the adapter casting subassembly starts at a station where two zinc alloy die castings are taken from an overhead mono-rail carrier. They are assembled, along with other parts, in a fixture directly in front of the operator. Most of the numerous small parts are taken from compartments in a hopper on transverse rails. Shown in back position in Fig. 1, the rails are moved by an air plunger so that the operator can set a completed subassembly in supports on a tray of the loop conveyor. The hopper is moved forward while the subassembly is built up, as in Fig. 2.

continued



Figs. 1 and 2. At the first station of the assembly line, adapter casting subassemblies are built. Note how an air plunger moves the mounted parts bins forward over the conveyor trays where air tools, hung on self-storing air hoses, are used to assemble the parts.



Assembling the Buick Speedometer, continued

Here, 19 parts, including a mirror in a die cast frame, and two wheels, one for mirror adjustment and one for a speed warning control, are assembled. All small ones are picked from the hopper and put together in a trunnioned turn-over fixture. Most fastenings are screws or nuts, driven by power tools spring suspended overhead. Each tool is set for a predetermined maximum torque. One tool has an angle head for side fasteners. When the subassembly is completed, the operator presses a pedal and the hopper retracts.

At subsequent stations, such parts as paper tubes, bulbs, direction signal elements, metal retainers and small plastic components are added to the adapter casting subassembly. Fig. 3 pictures a station at which the operator fastens a speedometer case subassembly (built up in the meantime on the second portion of the main assembly line) to a retainer, also built on the tray conveyor loop. A monorail carrier

brings the speedometer case subassembly from the loop on which it was assembled. Assembly work shown at the station pictured in Fig. 3 is done on a narrow bench in front of the tray conveyor using a power driver for screws taken from containers near at hand.

PRINTED CIRCUIT PANELS

It is significant that printed circuit panels, among the first to be used in such applications, are fastened to outside faces of the stamped speedometer housing. Much time saving results through the use of printed circuits, quickly fastened in place, avoiding the many hand operations that would be needed to join wires into harnesses and attach them to connecting parts.

Fig. 4 pictures the second and smaller printed circuit panel being fastened to one end of the speedometer housing, and a gas gage being fastened to the opposite end. For these operations, the assembly is supported on a shelf, bringing

the upper end at bench height next to the hardware containers. The gas gage is delivered, however, by a power-and-free conveyor system.

After these operations, the subassembly is delivered by a monorail transfer to the stations, Fig. 5, where the subassembly is placed on the top of the adapter casting. Screws are power driven to fasten the subassemblies together, making the final assembly ready for visual inspection. When this is done, the assembly is hung on an overhead chain conveyor for transfer to final inspection. The speedometer is tested at speeds corresponding to road speeds of 14, 45, and 60 mph and the gas gage is checked at half and full points. Adjustments are made in calibration if the readings are not correct. This leaves the assembly ready for shipment.

Assembly of the speedometer unit is performed along the second tray conveyor loop referred to previously. In this assembly, the speedometer is designed for conventional driving by a flexible

continued

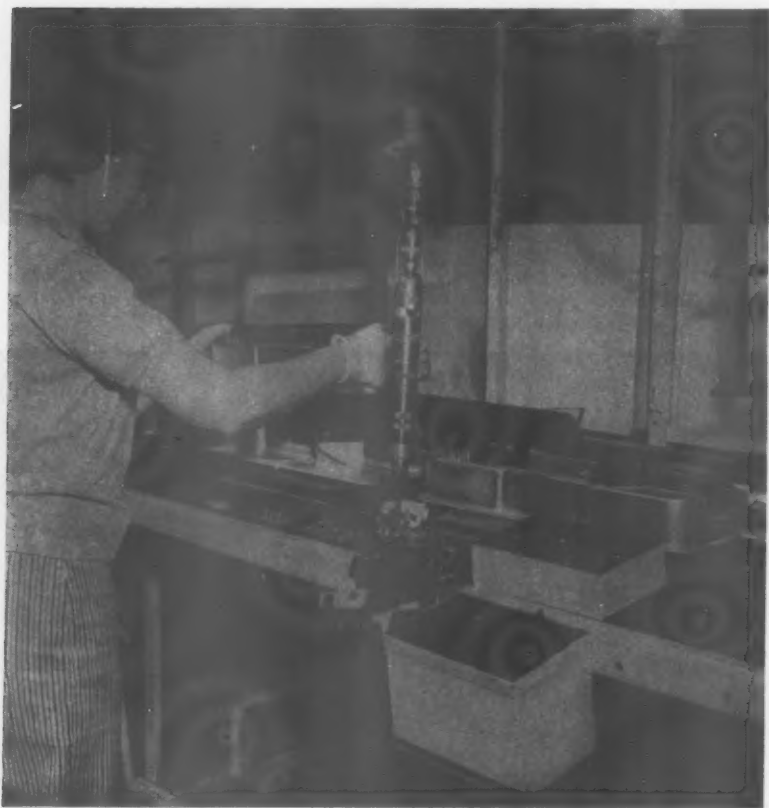


Fig. 4. A gasoline gage is fastened to one end of the speedometer case.

Fig. 3. A speedometer subassembly is lifted off tray conveyor for attachment to the retainer subassembly on the tray conveyor below.



Fig. 5. Where the two assembly line conveyor loops meet, the adapter casting subassembly is placed on top of and fastened to the speedometer subassembly.



Fig. 7. Operators press hair springs into speedometer tube spindles. Balancing of each tube is done on the instrument mounted on the table.

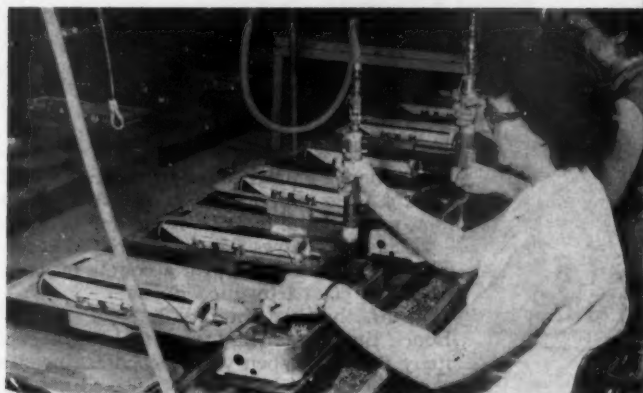
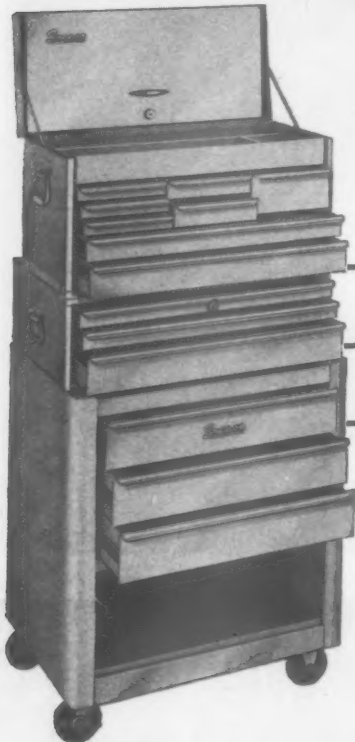


Fig. 6. Air driven tools are used to set screws fastening printed circuit panels to speedometer housing. Completed speedometers in the adjacent conveyor trays are eventually mounted inside the housings.



Fig. 8. Speed mechanisms are calibrated through adjustments of the hair spring. Magnetism of the rotary permanent magnet is varied by the Variac.

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Speedometer Assembly, continued

cable. But it is not of the type in which the needle is moved over a fixed scale. Instead, a very light hollow cylinder $12\frac{1}{2}$ " long, mounted on bearings, is used. One bearing is at each end of the horizontal axis. Part of the cylinder is white and part is red, the dividing line being a steep helix.

Angular motion of the cylinder is induced by a magnet rotated by flexible cable from the propeller shaft and is resisted by a spiral hair spring similar to that in a watch. These components are so adjusted in calibration that the angular deflection is proportional to car speed and this speed is indicated by the exposed helical line or parting on the cylinder surface, with respect to miles-per-hour numerals on surfaces seen in the mirror.

ASSEMBLY OF HOUSINGS

Fig. 6 shows station on the assembly line at which the drawn housings for speedometers are assembled. Some of the assemblies are shown along a track at a point where a printed circuit panel and a bulb socket are applied to an outer face of the housing and are fastened with screws. On each conveyor tray in the background is a completed speedometer ready for mounting in the housing.

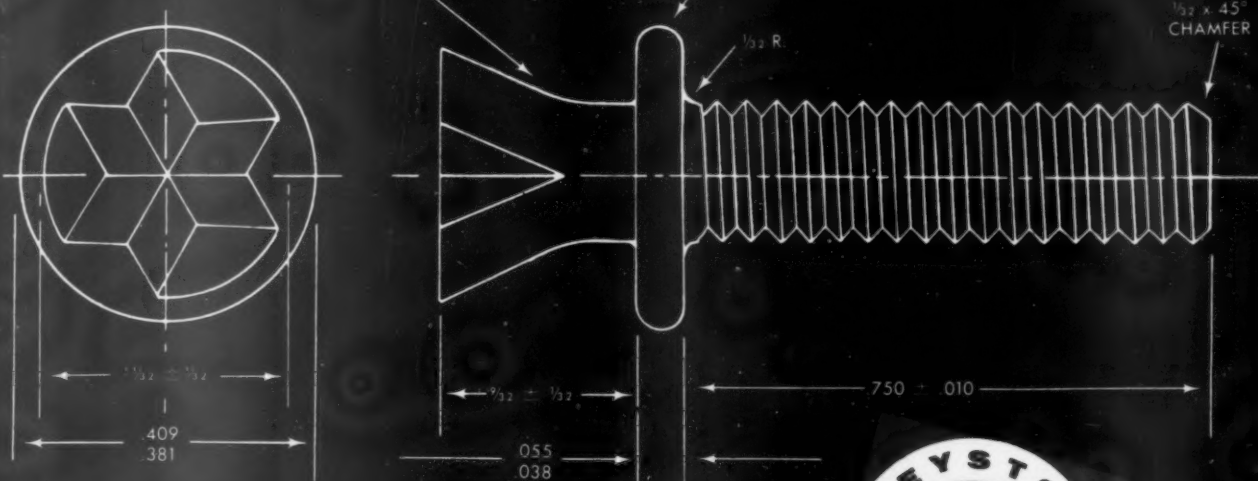
In stations pictured in Fig. 7, operators are shown pressing calibrated hair springs onto tube spindles. Mounted on each work bench is a machine which balances the tube after the spring is applied. Balance is so delicate that the spring must be in place before the cylinder is balanced because it was found that if applied subsequently, imbalance was likely to be found.

Calibration of cylinder deflection in relation to speed is done in the setup in Fig. 8. The operator usually has to vary the magnetism of the rotary permanent magnet by use of a Variac or the hair spring tension is changed or both. To avoid parallax variations, light is beamed through a slotted plate when directed onto drum.

The assembly operations dealt with here are typical of the whole group, where some 350 assemblies an hour are produced.

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*Assembly presses, setup for efficient operation,
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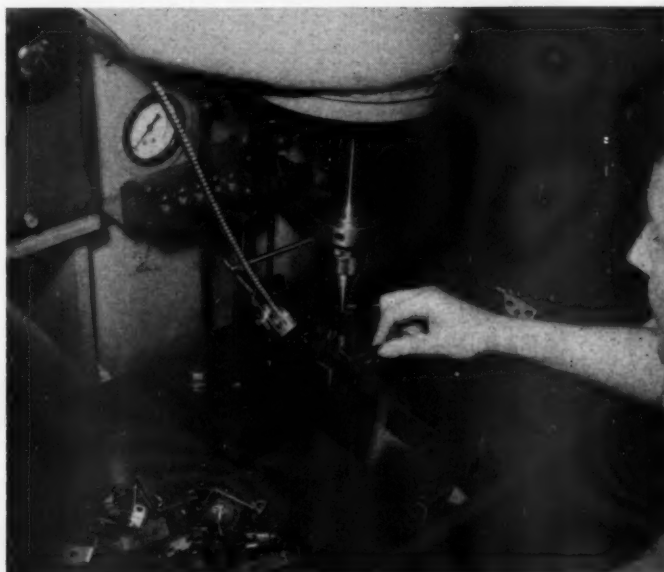
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By efficient use of five assembly presses, Washington Steel Products, Inc., Tacoma, Washington, has increased its capacity for staking and riveting hinges by 50%.

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continued



Upper right: Rivets drop down a shop-made tube where they are staked to fasten pin hinges. Lower right: Right and left hand parts are held in hoppers and finished assemblies are dropped down chute. Top: Overall view of assembly area, with auxiliary press at left.



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Press Assembly, continued



Holes are being sized in hinges.

assembly, the pinned hinge is dropped down a chute to a removable container.

A fourth press is used for auxiliary work, primarily sizing holes in hinges. Here the hinge is inserted on edge into a fixture so that a die-held rod goes through the hinge loop to size it. Since this is not a standard operation, the machine can be set up for normal assembly when production warrants.

A six-ton press stakes and rivets pins into plates to make up the pivot hardware for Lazy Susan revolving shelves. The operator places a rivet in a holding jig with her left hand and covers it with a plate in her right hand, then actuates the press.

At one time the hinge assembly operation was done on four-ton punch presses which had the disadvantage of varying press pressures. This led to loose hinges. More suitable to the application, the smaller assembly presses offer increased speed and uniform pressure for a sturdier fastening. •

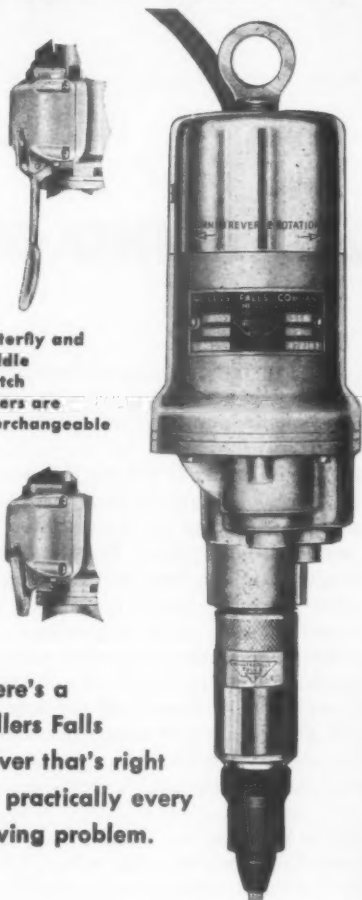


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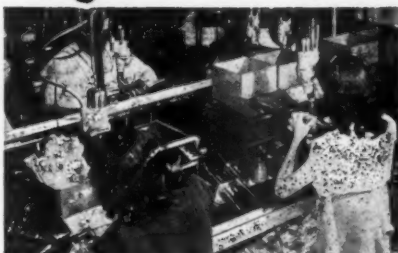
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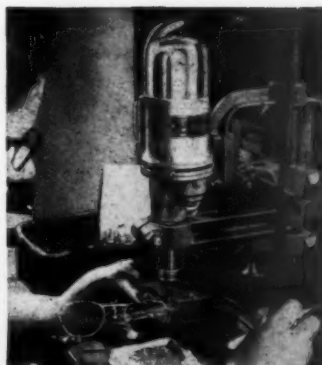


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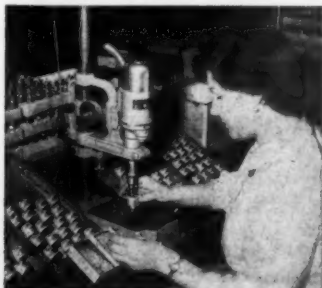
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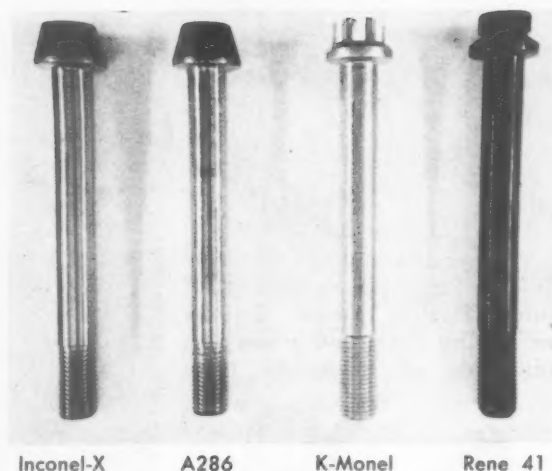
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ELECTRIC TOOLS

Rocketdyne recently embarked on an intensive evaluation program on high performance fasteners. This article presents an analysis of tests on bolts of type shown at right.



THE ENVIRONMENTAL TESTING OF



Although the sophistication of satellite and missile firings seems to have worn off the majority of the American public, those concerned with such "commonplace current events" are vitally aware that continuing research and testing are the price paid for success. Especially, in the case of the new high performance fasteners used in advanced missiles and engines is this particularly true. While it may be difficult to conceive of the scope of the problem area confronting these advanced type fasteners, an appreciation of what is required in terms of support research and development can be gained from an analysis of the mission of a typical modern liquid-fueled missile engine.

The key to the designer's dilemma involves three basic situations in the life of the power plant. First, the engine and supporting structure are fabricated under nominal room temperature conditions. As such, fasteners must be installed at room temperature and sustain required structural static strength. Second, just prior to firing, the missile must be fueled. Liquid oxygen is prominently used as one of the prime liquid fuel constituents in many engine designs. Here it should be pointed out that the temperature of liquid oxygen is -297°F. , and the use of this fuel constituent represents a sub-zero thermal

shock treatment for both structure and fasteners. Finally, when the engine is fired, tremendous thrust and heat are generated through the consumption of the high energy fuels.

With the combustion chamber of the engine acting as one of the heat sources, surrounding components may be subjected to temperatures in the order of $1500-1600^{\circ}\text{F.}$, and possibly higher. Thus, the life cycle of a bolt destined for application in a missile and/or engine may require structural integrity through a temperature range from approximately -300°F. to $+1600^{\circ}\text{F.}$ As with every other critical missile component, the success or failure of a mission must also depend on the performance of the special fasteners employed, irrespective of the environmental conditions imposed. Reliability, of necessity, is the essential underlying criterion of any design application.

To Rocketdyne, a Division of North American Aviation, the research, evaluation, and reliability of high performance fasteners constitutes a significant phase of the continuing work of their Engineering Standards Department. This Canoga Park, California, firm has been long noted as a key manufacturer of missile and rocket engines. It has been involved not only in the research of advanced fastener characteristics, but also in the development of Rocketdyne standards for such items as a means of assuring interchangeability, reliability, conformance to specified requirements, and of course, adequate sources of supply.

To keep pace with current and future requirements in this field, Rocketdyne recently embarked on an intensive comparative evaluation program on high performance bolts under the supervision of Richard H. Dawson, responsible engineer of

TABLE 1: TEST PROGRAM OUTLINE

REQUIREMENT	ROCKETDYNE PART NUMBER	BOLT MATERIAL	HEAD TYPE	NOMINAL SIZE	TEST TEMPERATURE
Ultimate Tensile Strength	RD111-3002-0748	Inconel-X	Internal Wrenching	7/16-20 UNF-3A	-300°F; Room Temp; +1300°F
Yield Strength ● 0.2% offset (on standard specimen)	RD111-3004-0748	A-286	Internal Wrenching	7/16-20 UNF-3A	-300°F; Room Temp; +1300°F
	RD111-4002-0750	K-Monel	External Wrenching	7/16-20 UNF-3A	-300°F; Room Temp.
Elongation	RD111-4004-0750	Rene 41	External Wrenching	7/16-20 UNF-3A	-300°F; Room Temp; +1600°F

SPACE AGE BOLTS

by **Harry S. Brenner**
President & Director of Research
Almay Research & Testing Corporation
Los Angeles, California

Engineering Standards. Specifically, the objective was the accumulation of design and engineering data on the bolts intended for use under a potential environmental temperature range from -300° F. to +1600° F.

The fastener test program, as outlined, called for an evaluation of the basic mechanical properties such as determination of yield and ultimate tensile strength, and elongation characteristics. In order to correlate the results of the subsequent bolt testing project, a complimentary materials mechanical property study was first undertaken under the direction of Nathan J. Hoffman, of Rocketdyne Materials Research.

Utilizing the basic test data accumulated through this preliminary effort, a series of test bolts were manufactured to specifications and standards established by Rocketdyne. The evaluation of the completed bolts, under the environmental conditions specified, was assigned to Almay Research & Testing Corporation.

Bolts fabricated from four prominent super alloys were submitted to Almay in two configurations: the internal wrenching head design and the external wrenching (twelve-point) head design. The bolt materials included in this study were A-286, K-Monel, Inconel-X, and Rene 41. All of the bolts were submitted in the 7/16" nominal diameter size (7/16-20 UNF-3A thread) for testing under the environmental temperatures specified by Rocketdyne, as noted in Table 1.

All tests were conducted in a 120,000 lb. capacity universal tensile test machine. Room temperature load-strain curves were developed utilizing a bolt extensometer. As part of the room temperature tensile holding fixtures, high strength alloy steel

threaded adapters were employed in lieu of test nuts. The thread engagement of all test bolts used with the threaded adapters was maintained at a minimum of 1 diameter (ID).

While no undue difficulty was encountered in conducting the room temperature tests, the unique environmental nature of the bolt test program posed two distinct problem areas: (1) simulation of the environmental temperature range and (2) development of load-strain curves under the actual test temperature conditions. For sub-zero testing, a special cryogenic test chamber was adapted to a tensile test machine. Ports in the top and bottom of the chamber permitted the installation of the bolts under test inside the chamber while application of load was being controlled externally.

To "pull down" to the temperature of liquid oxygen (-297° F.), cooling was achieved through two separate systems employing inert fluids for safety reasons. Liquid carbon dioxide was used to effect cooling to approximately -100° F. At this temperature, the cooling system was immediately switched to liquid nitrogen to bring the chamber down to -300° F. Temperature control was maintained and monitored through a thermocouple and indicating temperature controller. Each bolt evaluated was held at temperature (-300° F.) for ten minutes prior to test, thus simulating "short time exposure" at temperature.

Elevated temperature tests were conducted in a three-zone control, split-type, electric furnace. The versatility of the split-furnace arrangement allowed convenient access and set-up of bolts subjected to the high temperature studies. A chromel-alumel thermocouple mounted directly on the test bolt was monitored through an indicating temperature con-

continued

troller to assure accuracy of test temperature. As with the cryogenic phase of the program, all bolts were stabilized at test temperature for ten minutes prior to evaluation.

In order to generate the load-strain curves under the environ-

mental conditions, an extensometer arrangement was developed for universal use at both cryogenic and elevated temperatures. First, bolt holding fixtures fabricated from Inconel-X were designed for this particular study. Small diameter Inconel-X rods

were adapted to each of the upper and lower bolt holding fixtures with the rods extended through the bottom of the test chamber in use. Platforms secured to the portion of the rods extending outside of the test chamber provided the stages for pick-up of strain measurement by a microformer type extensometer measuring unit.

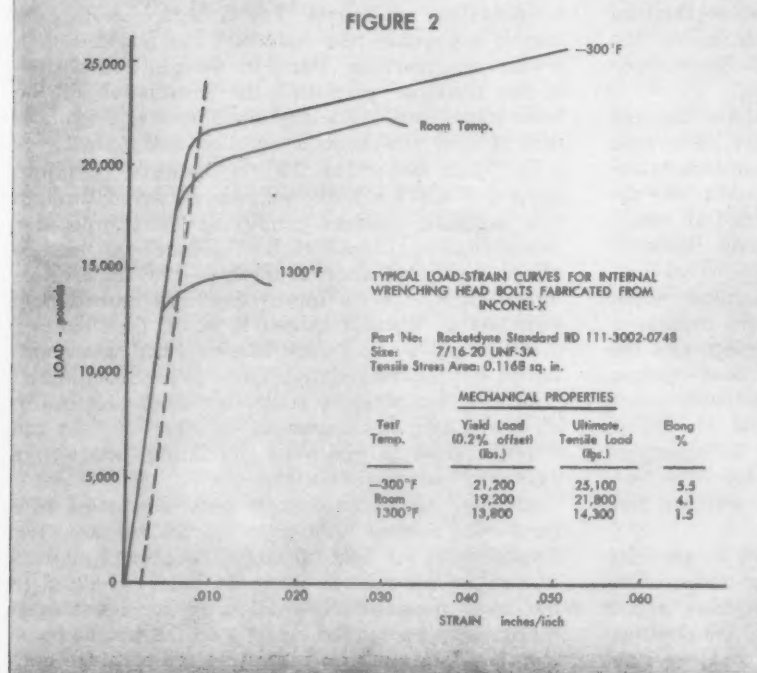
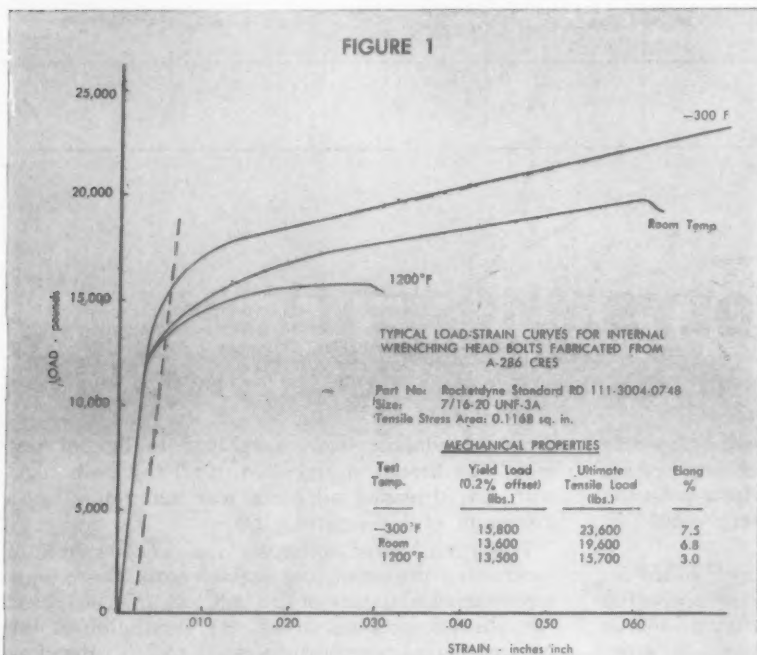
Earlier comparative evaluation and calibration of this measuring system with the standard room temperature bolt extensometer provided the necessary correlation and accuracy needed for this study. All test load-strain curves (room and environmental temperature) were autographically recorded at a magnification ratio of 50:1 on a stress-strain recorder.

One additional problem was introduced in the environmental testing of the bolts. The severe temperature ranges made it impractical to use threaded type adaptors. As a result, high performance, high temperature, self-locking nuts were employed to develop the full breaking strength of the bolts and thus provided incidental information on the characteristics of these fastener combinations. For all tests conducted at -300°F . and up to 1300°F ., self-locking nuts fabricated from A-286 and silver plated were used. Self-locking nuts fabricated from M252 and silver plated were required for the 1600°F . elevated temperature tests.

FOUR TYPES TESTED

Five bolts of each of the four basic configurations were tested at each of the test temperatures (-300°F ., room temperature, and elevated temperature as applicable). Load strain curves representing the average of the test results are illustrated in Figures 1, 2, 3, and 4. All tensile failures occurred in the bolt threads.

Calculation of yield and ultimate tensile strengths were based on a tensile stress area of 0.1168 square inches (per Paragraph 2 (d) 22 of Handbook H28 (1957)



—Part 1). Yield strength of the finished bolt was determined from the respective load-strain curves as the load corresponding to a 0.2% offset on the complete bolt. Ultimate tensile strength was determined from the maximum load developed by the bolt during the particular test.

TENSILE VALUES

It is to be appreciated that each of the bolt materials evaluated has its own set of characteristics with performance tailored to meet specific strength levels at optimum operating temperatures. Aside from the direct value of the raw data obtained (as reflected in Table 2), this project presents the opportunity for several other interesting observations. Considering the room temperature bolt strengths as "nominal," it is noted that the tensile values at -300°F . represent an increase in strength of approximately 13 to 21%. The higher physical properties at the sub-zero temperatures are undoubtedly related to the high nickel content of the special bolt alloys employed, but it is also significant that percent elongation (as measured from the load-strain curves) was similarly improved at -300°F .

As might be expected, the elevated temperature strength properties were appreciably lower than the "nominal" room temperature strengths. Elongation characteristics were correspondingly lower too. However, it is recognized that in general, a drop off in strength at high temperatures will be realized with most structural materials. The prime consideration for design is to know how much loss in strength to expect—or in a positive sense, exactly what minimum strengths can be developed and/or guaranteed at specific temperature levels.

LOAD-STRAIN CURVES

Here the importance of the yield strength data or more precisely, the value of the load-strain curves becomes increasingly sig-

nificant. A major requirement in aircraft and missile structural design relates to the yield strength, or load at which a defined permanent set occurs in the assembled joint or structure. In the case of threaded fasteners (such as bolts and screws), it is desirable to

introduce a tensile pre-load without exceeding the yield strength of the fastener during original installation. This is usually accomplished through control of torque values based on torque-tension relationships for various fastener combinations where

continued

FIGURE 3

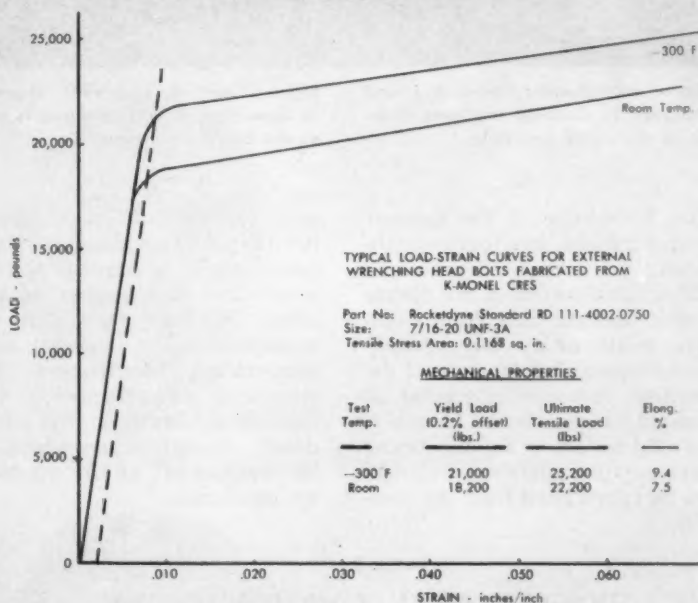
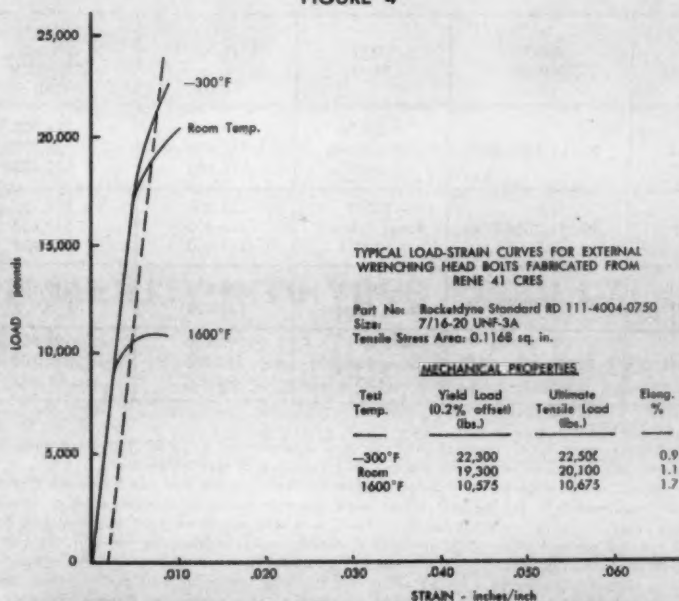
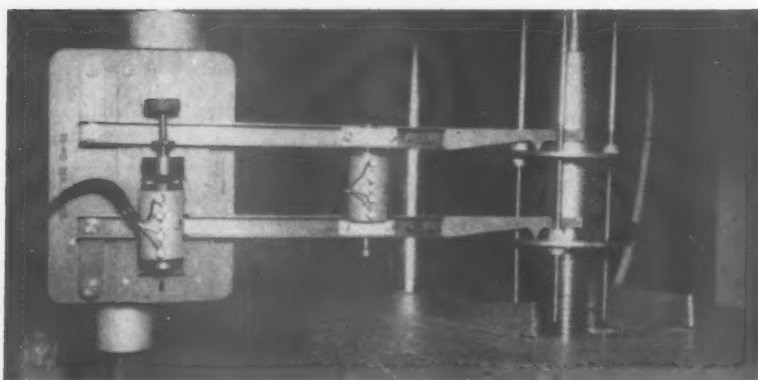


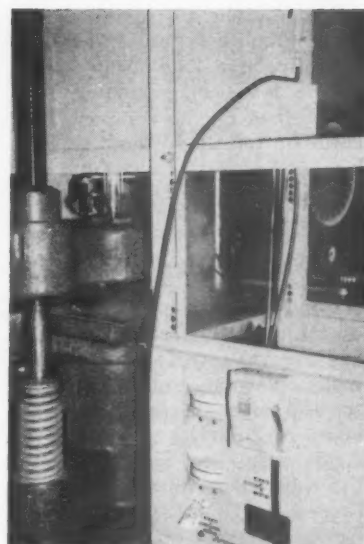
FIGURE 4





Above: Microformer measuring unit employed to develop the load-strain curves discussed in article.

Right: View of cryogenic chamber in operation. Liquid nitrogen is used as the cooling medium.



prior knowledge of the fastener yield strength has been established.

Much information of this nature (yield strength and torque-tension relationship) has already been accumulated for most of the standard fasteners operating at nominal temperatures. However, the vital need now for developing corresponding environmental data can be appreciated from the com-

plexity of current and anticipated future problems wherein structures may be designed to perform at elevated or cryogenic temperature, but are fabricated and assembled under nominal room temperature conditions. The structural requirements thus must be predicated on the critical design strength values which can be "confirmed" at the operating temperatures.

TABLE 2.
STRENGTH PROPERTIES OF SPECIAL ROCKETDYNE
BOLTS AT VARIOUS ENVIRONMENTAL TEMPERATURES

BOLT MATERIAL	PART NUMBER	TEST TEMP.	YIELD STRENGTH (0.2% offset) (PSI)	UTIMATE TENSILE STRENGTH (PSI)
Inconel-X	RD111-3002-0748	-300°F Room Temp +1300°F	181,500 164,400 118,100	214,900 186,600 122,400
A-286	RD111-3004-0748	-300°F Room Temp +1200°F	135,300 116,400 115,600	202,100 167,800 134,400
K-Monel	RD111-4002-0750	-300°F Room Temp	179,800 153,800	215,800 190,100
Rene 41	RD111-4004-0750	-300°F Room Temp +1600°F	190,900 165,200 90,500	192,600 172,100 91,400

(1) All test bolts were 7/16" nominal diameter and incorporated 7/16-20 UNF-3A thread.

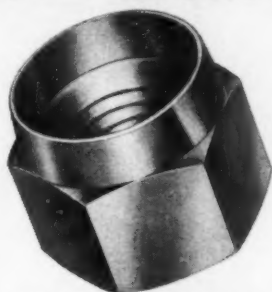
(2) Strength data based on short-time (10 minutes) exposure at test temperature.

(3) For a given bolt configuration, a percent offset on the complete bolt can be drawn that will be roughly equivalent to 0.2 percent offset yield strength value as measured on a standard tensile specimen. In order to establish this offset, a tensile specimen must be machined from one bolt, the 0.2 percent offset yield strength thus obtained is marked on the bolt stress-strain curve. A line can then be drawn through this point parallel to the modulus, and the intersection of this line with the strain axis is the offset for the one particular bolt configuration under consideration. Extreme care must be taken to assure the same number of threads are exposed on each bolt test.

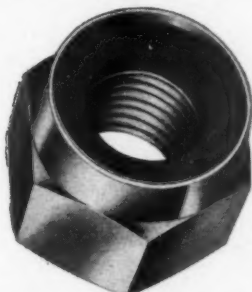
Since yield strength conceivably may be a limiting criteria, it becomes evident that installation torque of bolts must be controlled to assure that the strength at operating temperature is not exceeded by over-torquing at room temperature. In the case of the lower strength values expected at elevated temperatures, establishing authentic yield and ultimate strength data becomes a necessary first step towards the reliable use of the high-performance fasteners under such environmental conditions.


These and similar related fastening problems are indicative of the scope of study which is no longer waiting for "eventual solution." The particular project undertaken for Rocketdyne was intended to obtain rather specific answers to support advanced fastener standards development, and represents a marked contribution to the "state of the art". Similar noteworthy programs are being pursued elsewhere in the aircraft and missiles industry. Certainly the cost of research is high and while the immediate benefits will accrue to the defense effort, the net effect for industry remains the promise of greater reliability, know-how, and deeper understanding of fastener performance. •

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*Then roll the crown over smoothly and stake—
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the nut on and off the bolt 50 times or more and the nut will still remain tight under vibration! Protect the performance and the reputation of your product by guaranteeing fastener reliability. Try it yourself and see. Send for free test samples. Just tell us the size. Dept. S53-1097, Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, New Jersey.



**ELASTIC STOP NUT
CORPORATION OF AMERICA**



A finished turbine, leaving its handling cart, is placed in a shipping container.

Building Gas Turbines at AiResearch

*Imaginative yet practical,
AiResearch-Phoenix is solving
the problems inherent in
assembling multi-sized turbo-
machinery in small lots.*

Assembling turbo-machinery at The Garrett Corporation's Phoenix, Arizona AiResearch Manufacturing division is a demanding operation. Many of the problems involved will be found in any assembly department building complex, high precision products. Other needs are generated by the turbine units themselves and their extremely high operating speeds and temperatures. Still other assembly problems accrue from the way in which these machines are marketed—usually in small lots, in many diverse end forms, and for a wide range of end uses. This latter contingency immediately eliminates the use of a single, long assembly line on which machines progress from station-to-station and leave the line ready for the shipping departments.

All machines produced at AiResearch are turbine-driven, either from hot gases generated within the unit by its own fuel (self-contained small gas turbines), or by gas or air pressure from an auxiliary source (jet engine, ram air, or in the case of aircraft turbine starters and drives, a compressed air tank.) AiResearch gas turbines are available in a wide power range: from 30 to 850 hp. All of them operate at very high turbine speeds, with the aver-



by **Dale Hilbert**
Asst. Plant Superintendent, Turbo-Machinery
AiResearch Manufacturing Co.
Phoenix, Arizona

age around 42,000 rpm. The self-contained units which are powered by a turbine wheel over which the hot gases from a combustion chamber flow also operate at very high temperatures.

This brief description of the multiplicity of turbomachinery produced is in itself indicative of the assembly problems involved.

Layout of the assembly department at AiResearch includes a number of minor component lines all feeding a major or final assembly line. Thus one minor line assembles and tests fuel pumps and fuel injection equipment; another line assembles wiring harnesses.

Major gas turbine engines are comprised of three definite sections—the compressor section, the accessory section, and the “hot end” or turbine section. These sections are each assembled on a different line, then emerge on a final assembly line where they are assembled together to form a basic power unit. Some of the smaller and less complex starter and drive units have their own assembly line located as space permits within the department. These are “self-contained” lines, and do not interfere with operations on the major assembly line.

Assembly lines parts stocking is handled in various ways. Non-standard or specific unit parts are delivered to the assembly line area in lots of 20 or 25 each, and stored on shelves adjacent to the area at which they will be assembled. Standard parts are open stock and stored in strategically located cabinets. This standard stock includes all AN fittings, bolts, nuts, washers, etc. Assemblers are permitted to re-store the most used standard parts in small plastic workbench cabinets where they are convenient when needed. Gaskets and similar easily injured parts are stored in individual lots on strategically located peg boards from which they may be gently removed without danger of tearing, creasing, or stretch deformation. This peg board storage of gaskets has proved practical in the assembly department.

On most of the minor assembly lines, the work is manually bench handled from one assembly position to the next. But as the assemblies grow, and along the major gas turbine assembly line, they become far too heavy (to about 365 lbs. maximum) for manual handling. This leads to the development of the plant-engineered handling carts shown in the accompanying photographs.

ADJUSTABLE ASSEMBLY CARTS

These carts are all rubber-tired to facilitate easy movement. Each is equipped with a toe-pedal brake which presses a friction pad firmly against the floor to hold the handling cart in any desired position. Two of the cart wheels are rigidly attached to the frame, the other two are casters to permit cart turning. The U-frame section in which the assembly unit is mounted for handling swivels horizontally. A foot control locks this horizontal swivel in any desired

continued



With turbine mounted in handling cart, assembler tightens a stud bolt just prior to torque testing. Note ratchet mechanism with crank on side of cart permitting positioning of work at various angles.

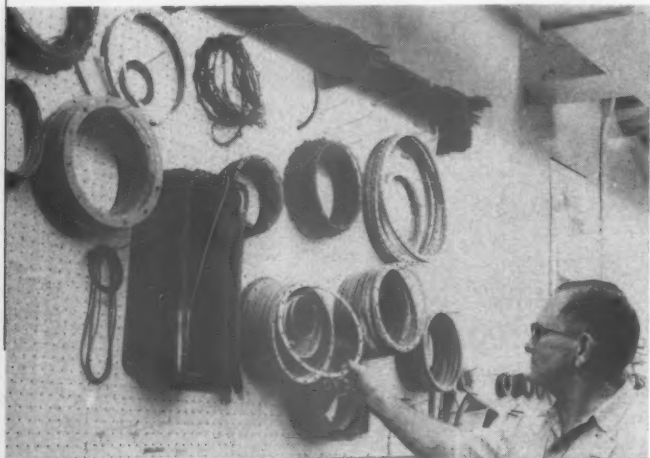
The final gas turbine assembly line at AiResearch.



Building Gas Turbines, continued

position. A vertically rotating cradle on the U-frame permits vertical rotation of the assembly unit at will. Here again a ratchet mechanism permits locking the assembly unit in any desired position. The combination of horizontal swivel and vertically rotating cradle makes it possible to position the assembly unit in the most convenient assembly aspect.

These carts are used for handling until the unit



Gaskets and other parts are stored on peg boards. They are removed without tearing or creasing.



Standard parts are kept in drawers and non-standard turbine parts in open cabinets and shelves.

is assembled, tested and ready for shipment. After the assembly unit on its cart leaves the major assembly line, the carts are hooked together in trains and towed across an open area to the plant's test facilities. Here, still on the carts, the units are placed in individual test chambers for a five-hour test run under all conceivable operating loads. Then, still on the carts, the units are towed either directly to the shipping department where they are unloaded into shipping containers, or taken back to an assembly area where final customer-required modifications are made.

In effect, these simple but versatile handling carts have solved all handling problems from the time a unit becomes too heavy for manual handling until it is in its shipping container and ready for the customer. It is difficult to visualize any other handling system which could offer so many conveniences at such low cost in the type of assembly work being accomplished at the AiResearch Phoenix plant.

As already mentioned, this turbo-machinery operates at terrifically high rotational speeds and elevated temperatures. This calls for extreme precision, both in parts production and during assembly. Balance, alignment, clearances, and fits are all extremely critical, with dimensional tolerances usually held within .0002". Rotating parts, such as the compressor and turbine wheels, must be critically balanced before installation. This is accomplished on Gisholt balancing machines in which the wheels are rotated while a strobe light illuminates areas causing poor balance. The wheel is then stopped and a small amount of metal removed. This operation is repeated until critical balance is obtained. The same operator performs both the balancing and metal removal operations. He thus soon obtains a "feel" of how much metal must be removed and goes ahead and does it himself without having to impart this "feel" to a second person.

Wheels are overspeed tested to about 100,000 rpm in a concrete-and-steel test pit prior to installation. Such rapid rotation actually causes a growth in the size of the wheel caused by centrifugal force while spinning. Normal wheel growth is considered in the tolerance calculations used during both machining and assembly.

CRITICAL ALIGNMENT PROBLEMS

There is no need to expand on the necessity for critical alignment of high speed rotating assemblies. And critical clearances are just as important. The clearance between all portions of a compressor or turbine wheel and its housing must be held within very close tolerances. Given high precision parts to begin with, both alignments and clearances become assembly problems.

In this operation, rigid inspection stations are impossible. By the time an assembly would reach an inspection station, certain critical factors might be obscured, covered up, or otherwise unavailable for conventional inspection techniques.

It is necessary, therefore, for the assembler to assume a degree of inspection responsibility himself. He must inspect his own work insofar as possible,

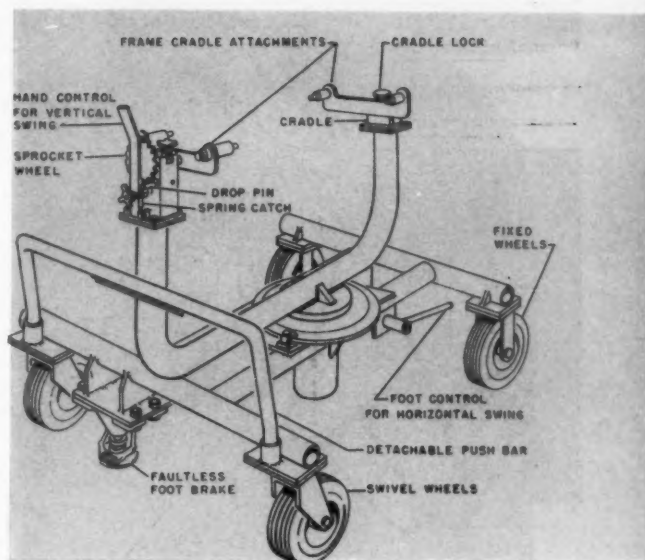
then "sign out" on a critical operation sheet which accompanies each turbo machine as it progresses toward completion. A "floating" inspector is then called over to stamp his O.K. on each operation. This, of course, does not in any way negate the importance of final inspection and testing, but it serves as a double-check. It also spots careless work.

PROGRAM FOR ASSEMBLY EMPLOYEES

This brings us logically to what is considered at AiResearch the most important part of all assembly operations—the assembler himself. The company spares no effort to make assembly work a satisfactory occupation, with each assembler doing the types of work he likes best. A cooperative work program has been developed which assures each man or woman equality on overtime work and which, at the other extreme, assures each assembler that he will not be permanently assigned to one of the few unpleasant jobs which every assembly line has. This program has paid off in two ways—employee satisfaction and loyalty, and better work.

In the face of existing circumstances, this program was difficult to develop. The fact remains that with so many different turbo machinery products being produced, one assembly line will be busy today, another tomorrow; certain departmental sections will fall behind in their work while others have little to do. A week later, the situation may have reversed itself. In some companies faced with a similar situation, work fluctuations are compensated for by layoffs and re-hirings.

One of the major objectives at AiResearch has been to assure each assembly line employee steady work. Each new employee (and all employees on the line at the time the system was inaugurated) is asked to fill out a form, detailing assembly work with which he is familiar, the types he prefers, and types



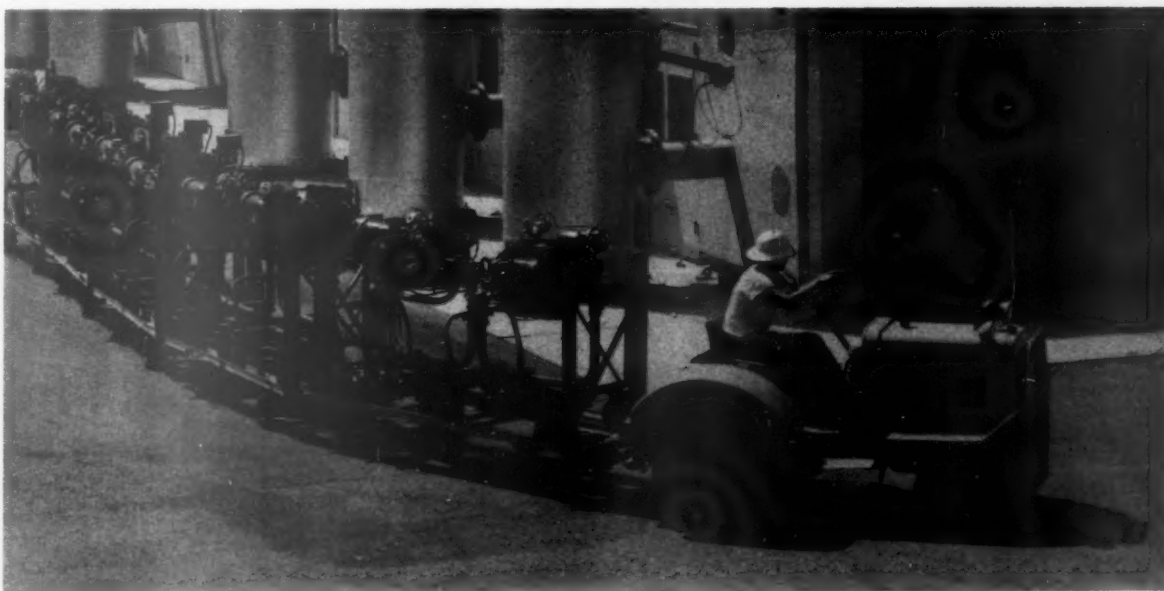
AiResearch engineers designed this assembly cart.

he is interested in learning when openings permit.

Insofar as possible, new employees are assigned to work with which they are familiar. But as time progresses, and as work fluctuations permit, they are trained in the other types of work they expressed a desire to learn. Before long, the employee becomes proficient in a number of departmental sections and may be rotated from job to job as required. Meanwhile, the form he originally filled out is kept updated at all times. A record of all overtime is recorded so that it may be evenly apportioned. And each man knows that from time to time he will be called upon to take his turn on one of the less satisfactory jobs.

continued

A train of assembled gas turbines is being towed to the testing facility.





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Building Gas Turbines, continued



A gas turbine, installed in a wagon, delivers compressed air to start a jet engine.

Thus when the work load diminishes in one departmental section but increases in another, a quick run down of the work forms covering the employees in the less active department will show immediately who can be transferred to the active section.

This system has worked well. AiResearch officials are firmly convinced that it solves a major personnel problem in conjunction with assembly of many different and highly complex products, produced in relatively small product lots.



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Assembly and Fastener Engineering



Thousands of acoustical panels are being placed in the USS Kitty Hawk. Here's how blind rivets, set by air power tools, reduce fastening costs.



Two-inch bats of insulation faced with aluminum sheets are fastened with blind rivets to the bulkhead in the ready and fan rooms.

BLIND RIVETING ACOUSTICAL PANELS

There is nothing about the U.S.S. Kitty Hawk, the new Forrestal class aircraft carrier now under construction in the yards of the New York Shipbuilding Corporation at Camden, New Jersey, which is small. The over-all length is almost equal to the height of the Empire State Building; her air-conditioning equipment could cool 20 theaters as big as New York Radio City Music Hall; and more than 3500 specially designed metal "pans" measuring 20 to 30 square feet each and filled with bats of fiberglass insulation are being installed in the hangar bay to provide better acoustics. The acoustical units are being installed in the overhead and along the entire length of the port bulkhead.

All of the units were designed and are being fabricated and assembled on board the ship by the subcontractor, Eastern Cold Storage Insulation Co., Inc. By going to a blind rivet and a portable pneumatic tool for setting it, Eastern is gaining an increased production rate and a reduction in man hours required for the project.

All of the metal parts making up a unit are assembled with Pop rivets. The parts include a rec-

tangular sheet of .040" perforated aluminum, double-flanged at its longer edge, and two channel-shaped pieces made of the same type of aluminum. The latter pieces are riveted to the two ends of the sheet with four rivets, one at each corner. This is done with the inner side of the unit facing up. It is the only fastening operation performed with the unit in this position.

Then the partially completed unit is turned over to be placed onto the other basic parts which are to be riveted in place. Wooden jigs on a waist-high table enable placement of the aluminum sheet onto the eight other parts, six clips to help retain the insulation in place and two reinforcing angles. Once holes have been drilled in the angles, and existing holes in the perforated sheet have been enlarged, the rivets are inserted. They are set in rapid-fire order because of their blind fastening feature. The power tool also contributes to the speed of the fastening operations. All of these are done with one type and size of rivet. This is possible because of the wide grip range of the rivet, minimizing inventory and simplifying instructions necessary for erection crews.

continued

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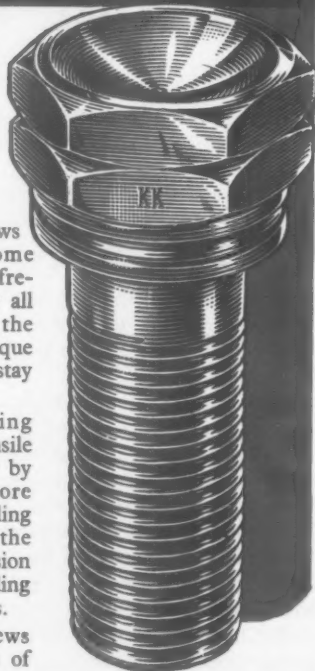


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Blind Riveting Assembly, continued



With an air tool, blind rivets are being quickly set to fasten insulation clips and reinforcing angles to the aluminum sheet.

Acoustical work is being performed in other compartments where blind rivets are also employed. The ready rooms for air crews and the many fan rooms are insulated. The interferences on the bulkheads and overheads, however, do not justify the use of prefabricated acoustical panels. Instead, the 2" thick bats of insulation are laid in and then faced with sheets of .040" aluminum cut to size. A light-weight steel channel is welded to the bulkhead to support and stiffen the sheet. Holes are drilled through the channel on 6" centers around the periphery and on 12" centers along the middle of the panel using the perforations in the facing as a guide. Here—a truly blind application—the rivets are inserted and set to hold the facing in place.



A look at construction progress on the U.S.S. Kitty Hawk, super carrier being built in Camden, N.J.

Assembly and Fastener Engineering



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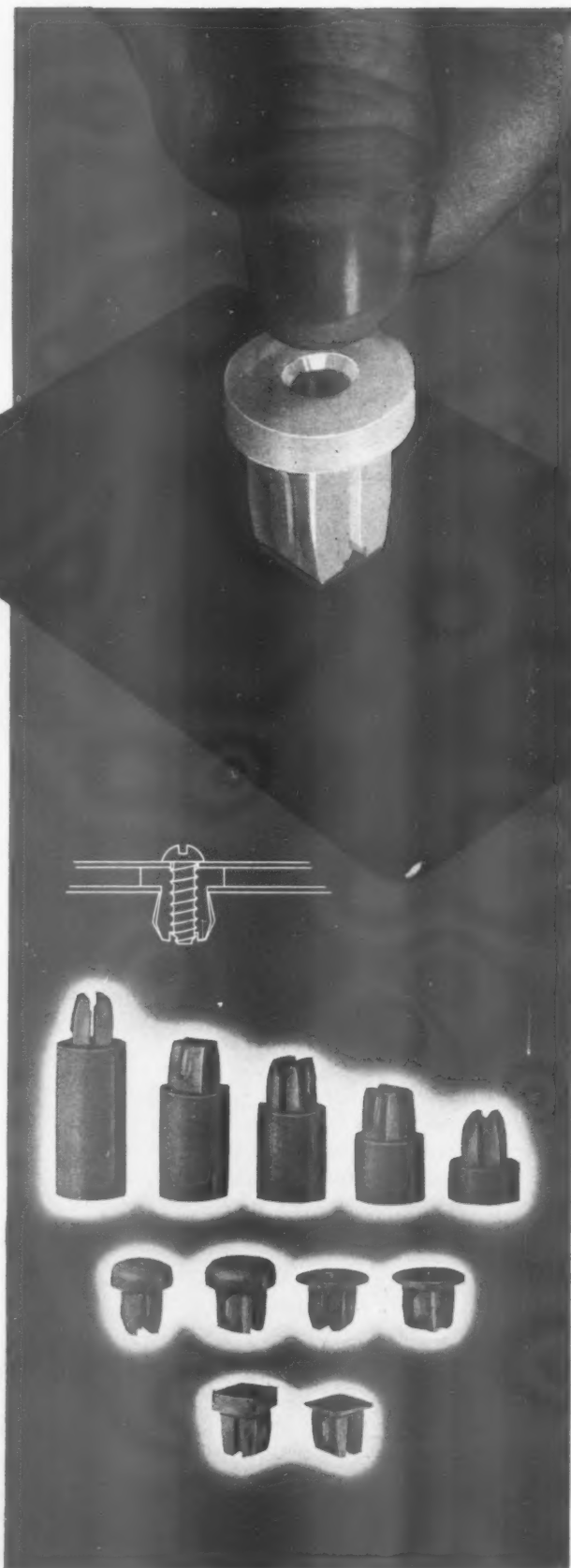
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What happens when a fastener is subjected to repeated stresses? In what area is failure most likely to occur? What about notch sensitivity?

WHAT ABOUT FASTENER FATIGUE?

by **Francis R. Kull**
Engineer, Special Assignments
Standard Pressed Steel Company



Many fastener failures that occur in machinery or equipment that involve motion are fatigue failures. Such failures are due to the action of repeated tensile stresses that are below the yield strength of the material involved.

A theory of the mechanism of fastener fatigue proposes that fatigue failure is a result of slip occurring along certain crystallographic directions. Under sufficiently high repeated stresses, this slip is apparently accompanied by such local crystal fragmentation that the rupture of the atomic bonds leads to the formation of sub-microscopic cracks which grow into visible cracks.

The rate of progression of this type failure will vary. The greater the magnitude of the repeated stress the smaller the cycle life before failure. In steel and in most other metals, if the stress is reduced low enough the material will withstand an infinite number of stress cycles. This stress level is known as the endurance limit.

STRESS CONCENTRATION

A fatigue failure could occur at any location on a smooth, polished specimen of equal cross-sectional area. But if we repeatedly stress a specimen that is not

equal in cross-section throughout its length, then the location of fatigue failure will become localized.

When a bolt is subjected to repeated stresses, there are two sections where failure is likely to occur. They are the junction of the head and shank or in the thread section. Failure occurs at these sections due to "notch effect" or "stress risers." (Notch effect is due to change in cross-section or diameter.) The concentration of stresses exists under both steady and repeated loads; however, the greatest effect is caused in repeated or dynamic loading.

Experiments and calculations have shown that the localized stresses in screw threads may be 2 to 6 times the nominal stress in the unthreaded body. The basic design of the thread (such as the thread angle, depth of thread, and radius at the root of the thread) are major considerations contributing to stress concentration factor. The two most important factors are ratio of major diameter to minor diameter and ratio of root radius to root diameter.

The mathematical calculations necessary to arrive at stress concentration factors are purely theoretical and are to be used as an approximation only in design. Experimental determination of stress concentration factors is a long and costly process. Only a limited amount of testing to correlate experimental results with theory has been accomplished, and much work remains to be done in this field.

If we vary the radius at the root of 1/4-28 threads, the stress

concentration will theoretically vary as follows:

Radius	Kt
.001	6.0
.002	4.8
.003	3.9
.004	3.4
.005	3.1
.006	2.8
.007	2.7
.008	2.5
.009	2.4
.010	2.3

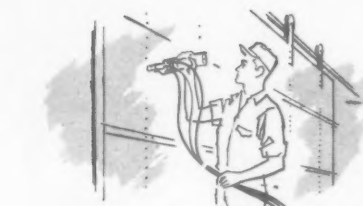
(Kt — for concentric grooves)
Kt = Theoretical Stress Concentration Factor

NOTCH SENSITIVITY

Stress concentration factors have different effects on different materials. This quality is known as notch sensitivity. Notch sensitivity can be measured by the ratio of notched to unnotched strength of a material. It is an excellent index of the toughness of a material under any type of loading. A material that is brittle is more sensitive to notches than a ductile material. This is illustrated when a tensile test is made on material with a circular notch. A brittle material in this test will fail at a lower stress in ppsi based on the cross-sectional area of the notch than a test of the same material with the same area and no notch.

A ductile material when tested in the same manner will show no apparent notch sensitivity. This is because the failure stress at the notch will be equal to or greater than the unnotched strength. It is true in either tensile or repeated loading. This phenomenon is caused by plastic yielding in the highly stressed regions of the notch which causes

continued



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- aluminum frame to brackets on masonite sheet
- truss plates
- leg ferrules to wooden legs without pre-drilling
- galvanized sheet steel to oak on hand planters
- headlight frames to headlights
- strapping on paint brushes to handles
- pre-drilled steel rules to benches



USO-77

Fastener Fatigue, continued

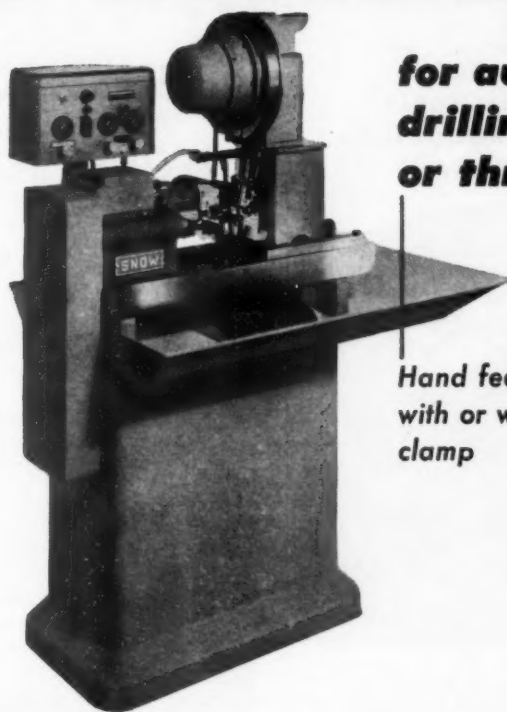
a redistribution of stresses. This is possible because of the wide spread between yield strength and ultimate strength. The local stresses in the notch do not approach the ultimate strength until the complete section reaches this strength. Brittle materials will have local stresses in the notch (due to stress concentration) that reach the ultimate strength before the complete section, causing premature failure.

Other factors contributing to notch sensitivity are hardness, composition of material, heat treatment, grain flow, and cold working which introduces residual stresses and increased hardness in the cold worked areas. Threads formed by rolling after heat treatment do not reduce the stress concentration but do increase fatigue life because of residual stresses which reduce the notch sensitivity.

When fatigue tests are conducted, the results are usually plotted on a graph. The curve developed is called an S-N curve or stress-cycle diagram. Points on the curve are determined by applying periodically varying stresses to screws at various levels and plotting the maximum stress endured by each versus the number of cycles to failure. As the testing stress approaches the endurance limit of the material being tested, the curve will become horizontal. For normal testing of bolts, the tests are discontinued after eight million cycles of loading.



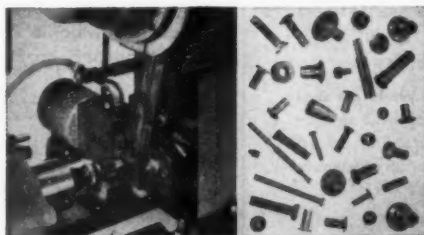
NOW AVAILABLE...



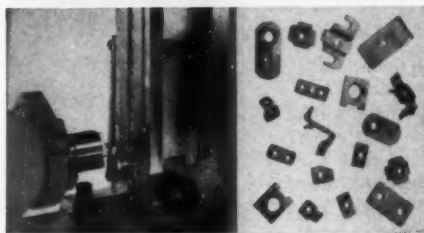
**for automatic
drilling, tapping
or threading**

**Hand feed or hopper feed
with or without air-operated
clamp**

NOW ...drill rivets faster with minimum tooling costs



Drills 500-3600 per hour;
hopper feed; air-operated
clamping. Capacity #74
(.0225") to $\frac{3}{8}$ " in mild steel.



Taps 4000 per hour
hand feed magazine.
Capacity #0 to $\frac{1}{4}$ " fine
pitch in mild steel.

A new horizontal version of the same operating principles long used in Snow vertical machines. Snow machines reduce changeover time, and cut tooling costs to a ridiculous minimum. On your next job, let us show you what the Snow method can do. Submit samples and prints.

Snow Manufacturing Company, Dept. C, 435 Eastern Avenue,
Bellwood, Illinois (Suburb of Chicago)

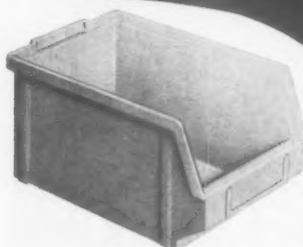
SNOW

master fixtures save dollars and days in tooling costs

Use postpaid card. Circle No. 237

Lewis UNITIZED ASSEMBLY CONTAINERS

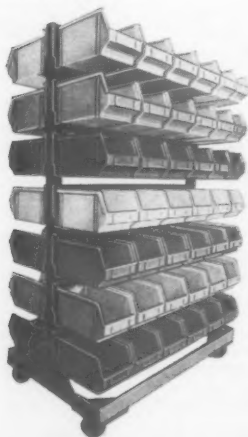
- FOR
- ASSEMBLY
 - PRODUCTION
 - STORAGE



Lewis Plastibox containers are one-piece molded plastic. They are smooth, strong, non-corrosive, easily cleaned. Colors, either green or yellow, are molded-in. Plastibox containers stack securely and

afford maximum storage of small parts. Sizes available are 8½" long x 5" wide x 4½" deep, 6" x 3½" x 2½", 3" x 3½" x 1¾", and 3" x 3½" x 1¾" with a vertical divider.

MOUNTING RAILS—The rails shown in the photo are supplied in 18" and 36" lengths to mount 4 or 8 of the 3 smaller size Plastibox containers; 3 or 6 of the largest size. Rails afford a wide variety of bench or wall arrangements for any assembly or storage operation.



MOBILE TRUCK ASSEMBLY

These Lewis trucks handle all sizes of Plastibox containers and allow the boxes to be quickly and easily moved from one area to another. Trucks are furnished with 36" mounting rails, two swivel and two rigid casters, and are finished in grey enamel.

WRITE TODAY
for complete information
and brochure

Material Handling Institute
Central States Show
BOOTH No. 415

G.B. **Lewis** COMPANY

210 Montgomery Street • Watertown, Wisconsin
Use postpaid card. Circle No. 238

Assembled in Ultra-Clean Room . . .

THERMIONIC CONVERTERS BECOME REALITY AT G-E

Thermionic conversion is no longer just a laboratory curiosity. The successful transition from the "bell jar" conditions of the laboratory to the production line has been accomplished at General Electric's power tube plant in Schenectady, N.Y.

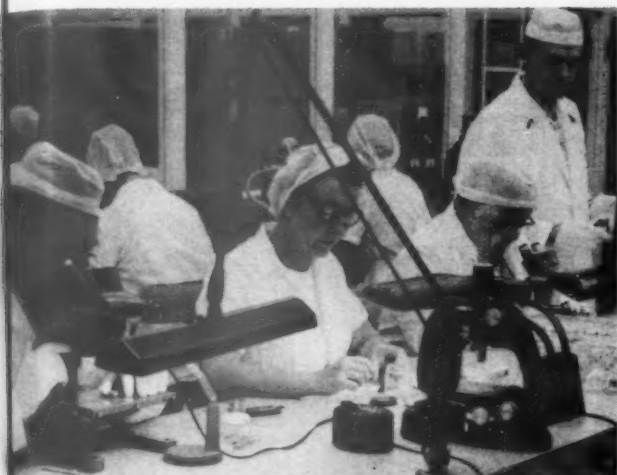
Practical sealed-off thermionic converters are being assembled by "snow white" techniques at the rate of 60 a week on a pilot production line. The devices are about the size of a silver dollar and weigh three ounces. They produce about one watt apiece. Production of these devices could be stepped up to 100 a week with only minor modifications of the pilot line.

Dr. A. O. Jensen, research engineer, reports that two major accomplishments permitted the transition from the laboratory to the plant. First was the development of a long-life spacing technique by which two optically-flat surfaces (which must operate at high temperatures) can be precision-spaced consistently at 0.5 mil. The second was the production of

Vacuum thermionic converter being assembled prior to evacuation and brazing at the power tube plant of G-E.



Assembly and Fastener Engineering



A controlled-atmosphere assembly area (above) is a necessity because of the 0.5 mil tolerance needed between the cathode and anode of unit.

At right is a sealed-off vapor thermionic converter. Stem-like extension from the anode side is the cesium reservoir.

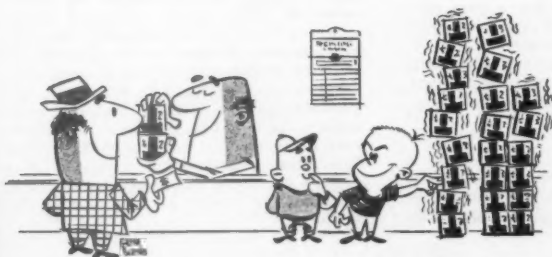


an ultra-high temperature converter envelope for operation in an oxidizing atmosphere.

These one-watt devices have a minimum power density of 0.2 watts per square centimeter of cathode surface and a minimum thermal efficiency of 2.5 percent, operating at a cathode temperature of approximately 1100°C.

Used in space power supplies for both military and scientific use, they can be adapted to operate on heat from such diverse sources as the sun, nuclear reactors, radioactive materials, chemicals and fossil fuels.

BOLTS 'N NUTS FROM REPUBLIC



"Wanna hear some new words? Listen!"

Adv. Republic Steel

Use postpaid card. Circle No. 206

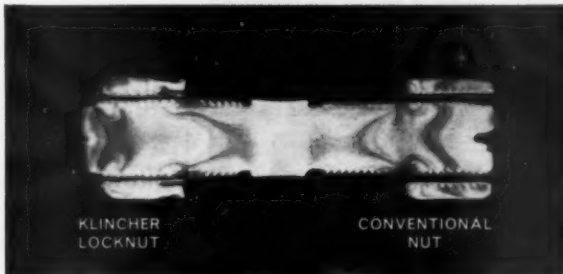
October, 1960

Diffuse the Load

with

Klincher LOCKNUTS

... make greater use of the
Load Capacity in the Stud



Isochromatic photoelastic analysis showing comparative load stress bands set up in the stud, in the Klincher Locknut and in a conventional nut.

Photograph and analysis by
W. E. BeVier
University of Minnesota



By diffusing the load **KLINCHER** Locknuts relieve stresses which cause fatigue and stud failure. The elasticity of the stud is more fully utilized. As a result, more wrench torque can be applied before exceeding the elastic characteristics of the stud. Nut and stud are locked tight radially and axially, resist high frequency vibration and withstand temperatures to 1600. F. May be reused hundreds of times.

Test samples will be furnished if complete data on specific application is sent with your request. Address such communications to Test Engineering at the address below.

KLINCHER LOCKNUT, INC.

2153 Hillside Avenue • Indianapolis 18, Indiana

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TRIMCLIP®

*over forty years of
industry leadership*

Do you have a fastener problem? TRIM-CLIPS have been widely known and used in the automotive, radio, stove, refrigeration and aircraft industries most extensively for attaching trim panels and mouldings to the structure.

Find out for yourself the many applications of TRIMCLIPS . . . by presenting us with your problem. Send sample section, if possible, otherwise full description and details.



GAGNIER

FIBRE PRODUCTS COMPANY

10151 Capital Oak Park, Michigan
Phone J0rden 4-2366

Use postpaid card. Circle No. 240

AS SMITTY SEES IT



Got a question, challenge, puzzle
to share or story to tell? Shoot it
along, we'd like to meet you.

DEFINITION

Modern Design (Detroit concept)—An idea thought up in 1940, put on paper in 1950, run in production for 1960, placed in the museum in 1970.

THE BREAKING POINT?

In mid-July the director of New York's Guggenheim museum resigned. It is reported that he could never reconcile the fact that the museum was praised more for Frank Lloyd Wright's architecture than for its collection of modern art. We can't help but wonder if our managing editor Matt Heuertz' July editorial was the breaking point for Mr. J. J. Sweeney?



SOPHISTICATED VOCABULARY

Rumor has it that Computereze is being accepted for foreign language credit in college these days. A **drum** isn't something to beat, but a rotating cylinder used to store information in machine language. Nor is a **gate** an entrance, but a circuit with one output. **Patch**? Not mending material, but a section of coding. And **flip-flop** has nothing to do with a palpitating heart. It's a device or circuit with two stable states.

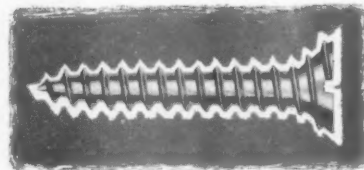
Assemble could mean to put things together. But it doesn't. It's to integrate subroutines and routines into a main program. And a **word** is a group of characters occupying one storage location.

For a 22-page booklet, full-o-cartoons and explaining some 82 computer terms, drop us a note. Compliments of Minneapolis-Honeywell.

MATH OVER LIGHTLY

What are the last three digits of the number 770000? (Answer on pg. 84)

—National Mathematics Magazine



NEW PRODUCTS

This self-countersinking wood screw completely eliminates the counter-sinking operation, report the engineers at Dumont Industrial Screw. The threads, instead of ending on the shank, continue up into the head. These threads on the head force the screw down into the surface just as far as you want to go.

WHOSE PLATFORM SOLVES THESE?

From our day-to-day contacts with American industry we are forced to conclude that its three major problems today are, in order: 1) Foreign competition; 2) Tax depreciation; 3) Improper torque.



ITS PLACE IS ALSO IN THE HOME

We were shocked to hear that the clothespin is making inroads in the industrial clamp market. This all began, we understand, at Oldsmobile in Lansing, Mich., where an employee suggested that the domesticated fastener be clamped on the radiator overflow hose when new radiators were being filled. Allegedly, this prevents spillage of anti-freeze and saves money. In consoling our many clamp manufacturers, we can assure them that this idea doesn't have a ghost of a chance of being adopted by America's thousands of dealer garages and service stations.

"Why is it that the engineer who has the most original ideas
is never around when you try to put the thing together?"



FASTENER BRIEFS

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY



Technical-ities

By Fred E. Graves

No difference between hex and cap screws

It's not the name of a standard fastener that determines whether to use it for a particular application, but vice versa. The application requirements for strength and tolerances dictate the fastener.

Thus, if you have a joint that calls for certain tolerances in a screw, obviously the one which satisfies those tolerances is the right fastener.

IDENTICAL STANDARDS



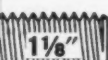
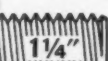
In the case of cap screws and hex screws, the standards will show you that these are merely different names for the same product. They're actually made on the same machines, to identical tolerances, and from identical materials.

No reason then to differentiate. For tapped holes, merely specify Hex Screws (SAE Grade 2) or High Strength Hex Screws (SAE Grade 5), and you'll get the right fastener with the quality needed.

For bolted joints, these same items are supplied with nuts when specified.

This should suggest a way you can extend standardization in your plant . . . and benefit from our new simplification of nomenclature which calls any fastener with head on one end and threads on the other a screw; and a screw plus nut a bolt.

See how "holding power" can cut fastener costs

SIZE	SAE GRADE	SAE PROOF LOAD	COST RATIO
 3/4"	Gr. 5	28,400 lbs.	100%
 1"	Gr. 2	16,950 lbs.	188%
 1 1/8"	Gr. 2	21,350 lbs.	239%
 1 1/4"	Gr. 2	27,100 lbs.	277%

Since the usual job of a threaded fastener is to hold an assembly tightly together, its *clamping force* is what you're really utilizing. This seems obvious. But how best to get the clamping force needed for the joint design? Not so obvious. Looking at size alone can be misleading . . . and quite costly, as the chart above demonstrates.

HOLDING POWER MEANS MORE THAN SIZE

SAE "proof load" of four different hex screws of standard steels, along with typical cost ratios, are compared. Almost unbelievable, isn't it? Yet it's a fact that the smallest of the group—the heat treated SAE Grade 5 RB&W High Strength Hex Screw exceeds all the others in load capacity. It can be used in place of any of the others in most normal usages.

Since it's smallest and therefore weighs the least, it also costs less . . . 64% less than the 1 1/4-inch grade

2 hex screw; 58% less than the 1 1/8-inch; 46% less than the 1-inch. And since holes can be made smaller, there are also the savings in production drilling . . . and possibly in materials, too.

DESIGN ADVANTAGE

Remember, too, that smaller fasteners are more easily torqued to higher preload levels . . . which helps keep joints tight, makes them more vibration-proof.

If you would like to explore this approach to fastener economy and better utilization of "holding power," consult with an RB&W specialist. Let him contribute his fastener knowledge to your design and production needs. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa., Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

Use postpaid card. Circle No. 241

THE SEARCH FOR A BETTER WAY...



Holo-Krome's revolutionary new Thermo-Forged process helps you reduce downtime, rejects, field service calls!*

After years of intensive research, Holo-Krome has discovered the "better way" to make Socket Screws. The most dramatic innovation in socket screw manufacture in 28 years, H-K's radically new continuous warm forming process produces socket screws near-perfect in structure and of a uniform accuracy and quality never before possible!

When you count the dollars an hour's downtime costs . . . or the cost of one day's rejects . . . or the price of just one field service call—you'll be quick to see

how important it is to specify Holo-Krome's THERMO-FORGED Socket Screws. Order these top quality Socket Screws from any one of H-K's nationwide corps of authorized distributors—or write us direct for the names of distributors in your area.

HOLO-KROME *Thermo-Forged** **SOCKET SCREWS**

SOLD ONLY THROUGH AUTHORIZED HOLO-KROME DISTRIBUTORS
THE HOLO-KROME SCREW CORPORATION • HARTFORD 10, CONN.

*Trade Mark of The Holo-Krome Screw Corporation



WHAT'S NEW IN EQUIPMENT

For information on any equipment listed here, use the postpaid card opposite page 82. Just circle the number on the card matching the number following the description. We'll do the rest.



(See 1)

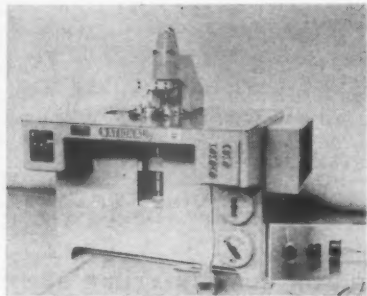
AIR FASTENING TOOLS NOT MORE THAN 1½ LBS.

New reversible and non-reversible angle and in-line nutsetters and screwdrivers are equipped with Safe-Torque clutches. The No. 1 series portable air tools have motor speeds ranging from 1000 to 20,000 rpm.

Total weight of each tool in the line is not more than 1½ lbs. The units are available with suction pick-up for handling non-magnetic fasteners, as well as magnetic and 43 other attachments. Two lever controls, plus an automatic remote head control, are offered.

Gardner-Denver Co., Quincy, Ill.

Use postpaid card. Circle No. 1



(See 2)

UNIT WELDS UP TO 2000 TRANSISTORS AN HOUR

Transistors can be welded up to 2000 an hour on an automatic console type machine which can be tooled for either dial feed or single point operation.

A 3 ft. by 4 ft. table, 32" high, forms the unit's base and is designed specifically to accommodate a standard dry box. An operator, seated and hand-loading a six-station dial, can produce 2000 transistors an hour.

A design feature locates the transformer in the base of the unit. This permits a user who has a single point machine to convert to dial feed with minimum changeover.

National Electric Welding Machine Co., 1845 Trumbull St., Bay City, Mich.

Use postpaid card. Circle No. 2

ADD PORTABLE RIVETER TO ERCO PRODUCT LINE

A portable riveter, which punches the hole and sets the rivet in about two seconds, has been added to the Erco line of machine tools. It was introduced in September at the Production Engineering Show.

The 50-lb unit is furnished with a cable-type balancer for overhead suspension. Its construction is such that it can also be permanently installed on a work bench.



(See 3)

Like the Erco stationary riveters, the new unit is of the pneumatic-squeeze type. While the first model is an ⅛-in. machine, other sizes will be available.

The riveter can store approximately 500 flush- or round-head rivets in a rotating drum that automatically drops them in place.

Electronics Division, ACF Industries, Inc., Riverdale, Maryland.

Use postpaid card. Circle No. 3

HIGH TEMP VACUUM FURNACE FOR METAL RESEARCH LABS

A high temperature vacuum furnace features what is reported to be the smallest hot-zone in commercial equipment today. The Model 300 is a resistance-type unit performing brazing, bright annealing, sintering and melting at pressures of .1 to .05 micron Hg at uniform temperatures up to 4532°F. Only 5 kw of power are required for continuous operation at the maximum temperature.

The unusually small hot-zone (1" x 3") makes the unit suitable for metal research. The console unit is 30" wide, 30" long and 35" high.

Vacuum Furnace Div., Richard D. Brew & Co., Inc., 90 Airport Rd., Concord, N.H.

Use postpaid card. Circle No. 4

MACHINE SETS 6 TWIN EYELETS IN TERMINAL BOARD

Completely automatic feeding and setting of six twin connector eyelets in a plastic insulating terminal board no bigger than a cigarette lighter has been achieved by the Model F eyeletting machine.

A component of an electrical device being produced by one of the country's major companies, the terminal board is of 3/16" plastic material, and is approximately 2½" x 1½". The eyelets are in six pairs, and are set in an irregular pattern. Automation of terminal board production is achieved by accurate alignment of a special setting bar

General Vibrex MULTI-FUNCTION FASTENERS



The versatile half-turn fasteners combine the advantages of a quick acting panel lock with those of an elastic shock isolator.

- Damp noise
- Eliminate rattles
- Simplify assembly
- Correct Alignment
- Absorb shock, vibration

The Vibrex Fastener locks by means of an expanding, waterproof and dustproof sleeve of especially compounded rubber. This forms an elastic suspension which actually floats the panel-base assembly in live resilient rubber.

Call your
Avnet
Applications
Engineer

For dependable service



and immediate delivery*

AVNET

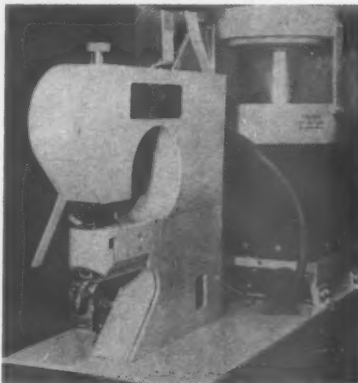
AVNET•70 State St., Westbury, N. Y. ED 3-5900
AVNET•5877 Rodeo Rd., Los Angeles 16, Cal. UP 0-6141
AVNET•48 Winn St., Burlington, Mass., BR 2-3060
AVNET•4180 Kettering Blvd., Dayton 39, Ohio AX 8-1458
AVNET•2729 N. Mannheim Rd., Melrose Park, Ill. GL 5-816C
AVNET•1262 N. Lawrence Sta. Rd., Sunnyvale, Cal. RE 6-0300

Use postpaid card. Circle No. 243

and a rigid frame. These provide uniform pressure on all six twin contact points scattered over a broad pattern range.

United Shoe Machinery Corp., 140 Federal St., Boston 7, Mass.
Use postpaid card. Circle No. 5

SQUEEZE RIVETER FOR PLASTICS, BRITTLE PARTS



Riveting of delicate parts made from plastic, ceramics, phenolics and fibres is done on a Squeeze Riveter. The semi-automatic machine can be made fully automatic from building block units.

Equipped with hopper feeders, production rates are up to 2100 multi-component assemblies per hour. Range of parts handled is from .032" pins to 1/4" stainless steel rivets.

The riveter can be adapted by using optional changeover parts for other assembly operations, swaging, coining. Aidlin Automation, Inc., 1613 E. New York Ave., Brooklyn 12, N.Y.

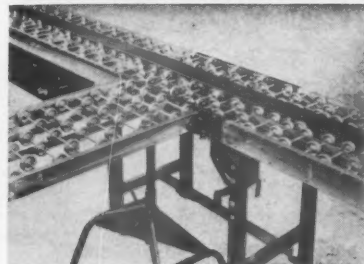
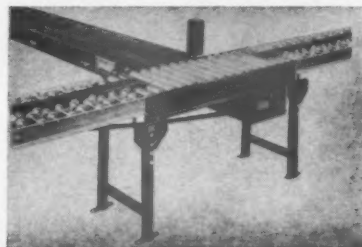
Use postpaid card. Circle No. 6

CONTINUOUS DIAL-FEED WELDER FOR SUB-MINIATURE PARTS

A fully-automatic welding system has been designed to assemble and weld up to 300 sub-miniature electronic components per minute.

The machine includes load stations to feed microscopic parts in the assembly of transistors, diodes, resistors, etc. Component parts are fed and positioned

TWO TRANSFER UNITS ADD TO CONVEYOR USEFULNESS



A manual right-angle transfer device and a live roller powered transfer section have been developed as accessories for the Rapistan conveyor.

Operated by either a hand or foot lever which elevates a set of wheels at right angles to the main line, the manual transfer unit provides an effective way to move items on or off the adjustable pressure conveyor. This section comes in two foot unit lengths, 18" or 24" wide.

The live roller transfer unit enables materials to be merged from two conveyor lines into one line or from a single line into two lines.

The Rapids-Standard Co., Inc., 342 Rapistan Bldg., Grand Rapids, Mich.

Use postpaid card. Circle No. 7

automatically from a vibratory hopper onto the electrodes. Unit operates with any Raytheon a-c or d-c standard power supply.

Commercial Apparatus & Systems Division, Raytheon Company, 1415 Providence Turnpike, Norwood, Mass.

Use postpaid card. Circle No. 8



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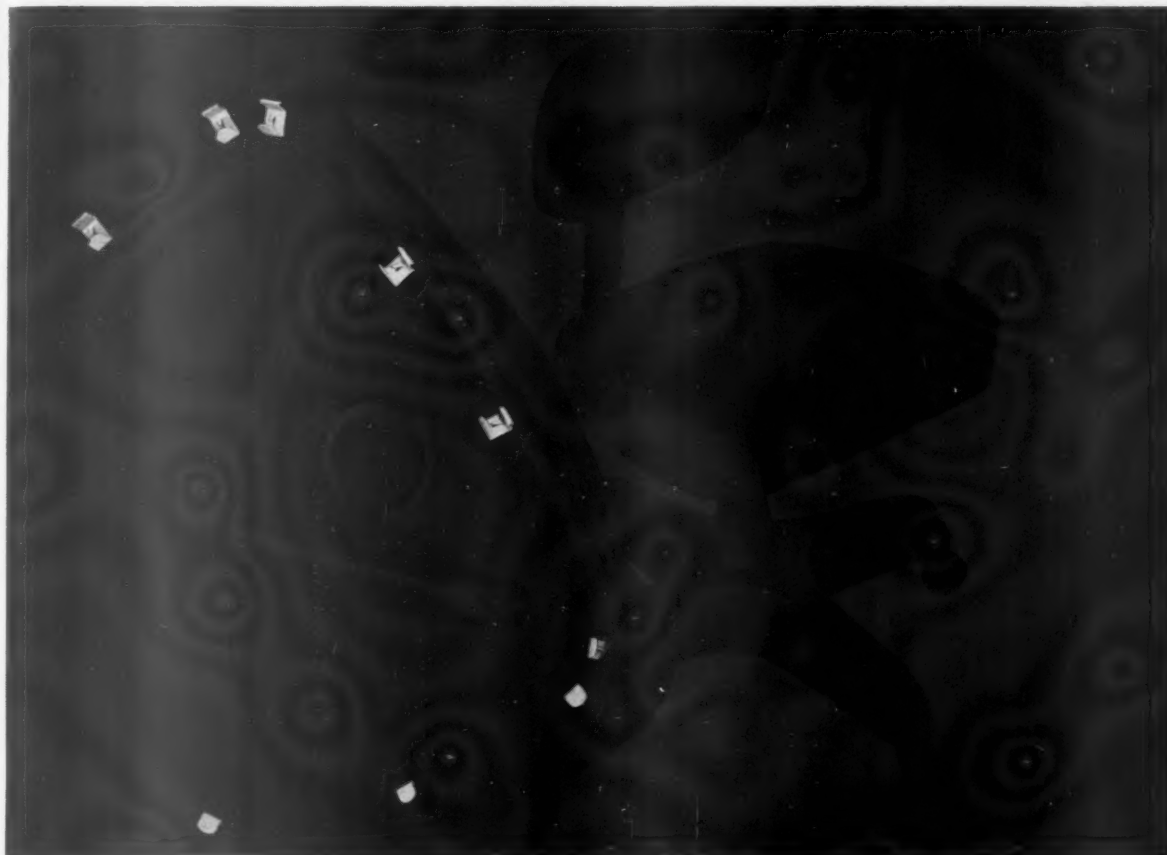
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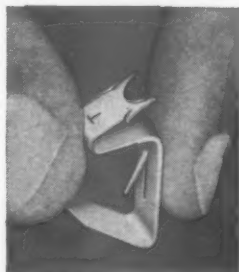
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Another **SPEED NUT** Savings Story...

62% cost reduction made with **SPEED CLIPS®** on Cramer Posture Chairs



A dozen **SPEED CLIPS** now do the job of fastening upholstery to the steel seat of Cramer Posture Chairs. Before the switch to Tinnerman **SPEED CLIPS**, an expensive formed-steel rim was spot-welded to the seat to do this job.

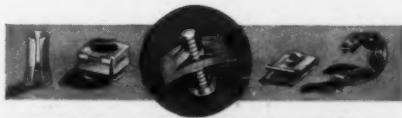
SPEED CLIPS save Cramer at least 46 cents—or 62% of fastening cost—on each chair...they eliminate the rim-forming and spot-welding operations...permit faster, easier assembly...simplify disassembly if the chair ever needs re-upholstering. Working jointly with Cramer's engineering staff, Tinnerman fastening specialists were able to provide all these advantages without sacrificing product quality.

Assembly costs on your product are likely to

benefit greatly, too, if you'll enlist the aid of this Tinnerman team. You can arrange for a free **FASTENING ANALYSIS** of your product simply by calling in your nearby Tinnerman representative. You'll find him listed in the "Yellow Pages" and in Sweet's PD File under "Fasteners." Or write direct to:

TINNERMAN PRODUCTS, INC.
Dept. 12 • P.O. Box 6688 • Cleveland 1, Ohio

TINNERMAN
Speed Nuts®



FASTEST THING IN FASTENINGS®

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario. GREAT BRITAIN: Simmonds Accessories Ltd., Treforest, Wales. FRANCE: Simmonds S.A., 3 rue Salomon de Rothschild, Sartrouville (Seine). GERMANY: Mecano-Druck GmbH, Heidelberg.
Use postpaid card, Circle No. 244

October, 1960

SCREW-HOLDING DRIVER FOR MINIATURE SCREWS



Slight pressure of one finger on the swivelled end of a screw-holding driver actuates the mechanism, which is non-magnetic. Miniature slotted screws are held securely by the driver until the screw is tightened, whereupon the tool automatically releases and resets.

Replaceable, resharpenable, interchangeable bits are available in four sizes to fit slots from .010" to .038", and in 3/4" or 2 3/4" lengths.

Hodat, 3017 Summit St., Oakland 9, California.

Use postpaid card. Circle No. 9

ACID CLEANS METAL WITHOUT CORROSION

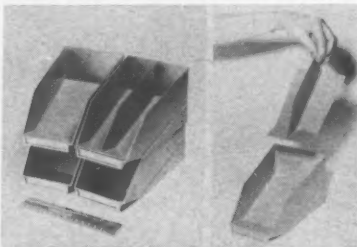
Metals can be acid cleaned by immersion without corrosive effect by using Unicon, an additive for hydrochloric acid. The product is effective

in inhibiting corrosion on any metal, including iron, copper, alloys, galvanized sheet or aluminum.

Developments Unlimited Inc., 328 Broadway, Passaic, N.J.

Use postpaid card. Circle No. 10

PLASTIC DIVIDER FOR ASSEMBLY PARTS BINS



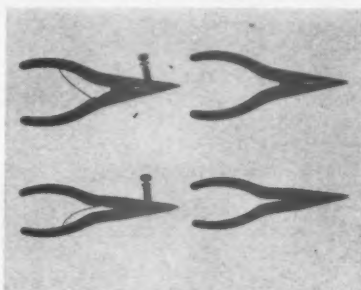
A high impact plastic insert divides the contents of assembly bins—providing greater versatility in small parts handling.

All-plastic construction eliminates problems of magnetic interferences and parts contamination through paint corrosion. The divider fits model A-10P bins, which can be stacked in all-plastic semi-circular arrangement or with steel bins.

Stackbin Corp., 1155 Main St., Pawtucket, R.I.

Use postpaid card. Circle No. 11

PLIERS FOR EXTERNAL, INTERNAL RETAINING RINGS

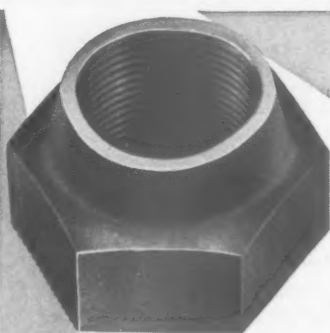


A line of pliers has been developed for applying and removing internal and external retaining rings.

The pliers are made of black-finished carbon spring steel with induction-hardened tips to grip ring lugs securely yet readily release rings after application or removal.

Standard pliers for external rings or internal rings feature an adjustable stop and a music-wire spring to save time on repetitive ring application and removal. The adjustable stop and spring also prevents overspreading of external rings. A thumbscrew adjusts the plier opening to the ring size and a locking nut locks its position to assure a precise opening every time.

All pliers are designed to accommodate several ring sizes and are manu-



Three sectors of the tapered portion of the CONELOCK nut are preformed inwardly (Fig. 1). When the Nut is applied to a bolt, these conforming sectors are elastically returned to a circular configuration and create an inward and downward pressure which produces intimate contact between the load carrying flanks of the nut and bolt threads (Fig. 2). The shape of the cone sector displacement insures conformity with the mating bolt and maximum fric-

New One-Piece
"Cone Lok"
with prevailing torque

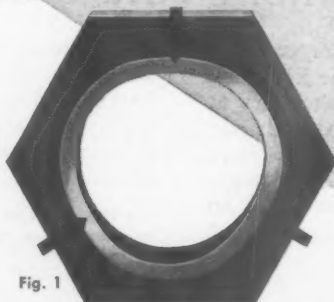


Fig. 1

tion contact area. . . . The closed stress path in the locking portion of the nut and the advantageous distribution of locking pressure, produce a locking device of high fatigue life . . . and equivalent locking force is exerted at only a fraction of the stress of any slotted type locknut. CONELOCK main-

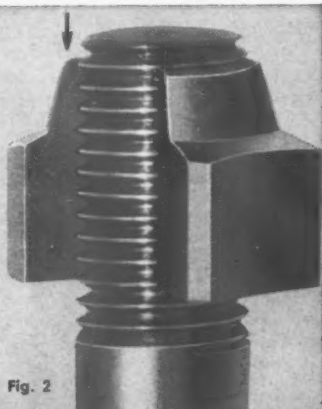


Fig. 2

tains its locking action through many re-applications. . . . It is adaptable to high, and low torque assemblies . . . to high torque stop-nut applications . . . and may be obtained in sizes from No. 10 through 1 1/2", Full and Thick dimensions are "Standard". . .

Send for brochure which includes complete engineering specifications.



NATIONAL MACHINE PRODUCTS COMPANY

an **sps** company 44250 UTICA ROAD UTICA, MICHIGAN

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Plant Tub



OCTOBER 1960

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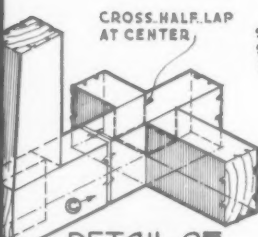
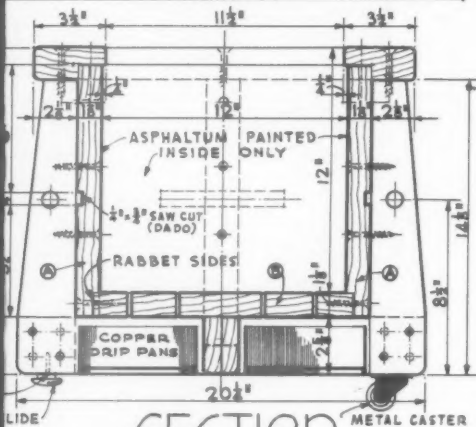
HOME WORKSHOP
PROJECT of the
MONTH



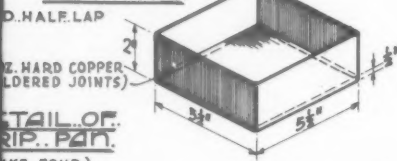
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Rockford, Illinois

BILL OF MATERIALS

1 7/8" x 12 7/8" x 13 7/8" SIDES	A	ROCKFORD-PHILLIPS® CADMIUM
1 7/8" x 12 7/8" x 12 7/8" BOTTOM	B	PLATED BRASS WOOD SCREWS
1 7/8" x 2 3/8" x 20 1/2" BASE	C	12 3" NO. 9 OVAL HEAD
1 7/8" x 2 3/8" x 14 3/8" PILASTER	D	1G 2" NO. 9 " "
1 7/8" x 3 1/4" x 18 1/2" CAP	E	20 2 1/2" NO. 10 " "
3/4" x 6" DOWELS	F	1G 2 1/2" NO. 8 FLAT " "
3/8" x 6" " "	G	1G 1 1/2" NO. 6 OVAL " "
3/8" x 2" " "	H	4 8 1/4" x 8 1/4" x 2" DRIP PANS



DETAIL OF FRAMING



TAKE FOUR)

OPTIONAL:
FOR EASY SLIDING ON
SMOOTH SURFACES..METAL
SLIDES OR CASTERS MAY
BE INSTALLED.

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- I HAVE INCORPORATED BEAUTY STRENGTH & EASY HANDLING IN DESIGNING PROJECT NO.3.IT IS ALSO VERY SIMPLE TO BUILD.
- FOR PERMANENCE I RECOMMEND 1 1/2\"/>

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NEXT MONTH WE WILL FEATURE A PRE-CHRISTMAS PROJECT..TO GIVE YOU PLENTY TIME TO GET IT READY FOR DISPLAYING AT CHRISTMAS.

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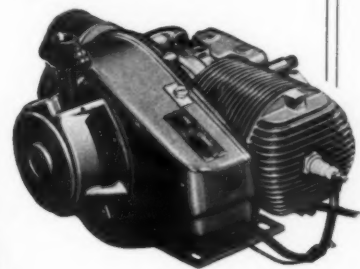
SERIES.. NO.10	
PROJECT 8	Designed by G. AGER
USE FOR COMMERCIAL PURPOSES IS STRICTLY FORBIDDEN	OF ROCKFORD

HAGER DESIGN STUDIO.. ROCKFORD, ILL.

★ HERE THERE AND EVERYWHERE with "ROCKFORD" Screws and Bolts ★



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New 4 h.p. "580"
for Class A and B

Manufactured by:
WEST BEND ALUMINUM CO.
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BIRD FEEDER
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AUTOMATIC PARTY
PERCOLATORS

TAPPING SCREWS



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- CLUTCH HEAD
TYPES "A" and "B"

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Screw Products Co.

ROCKFORD

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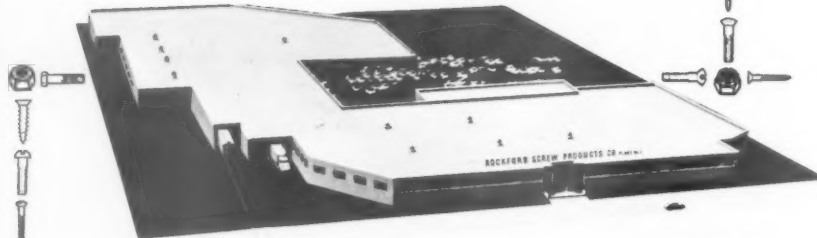
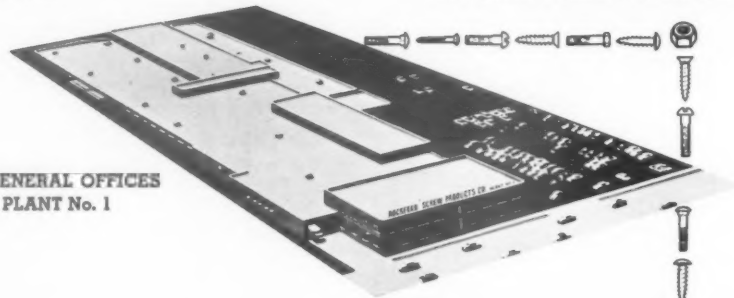
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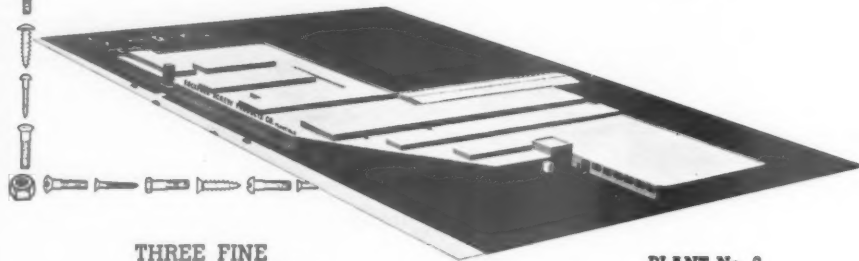
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GENERAL OFFICES
& PLANT No. 1



PLANT No. 2



PLANT No. 3

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MODERN PLANTS
PRODUCING "ROCKFORD" QUALITY CONTROLLED
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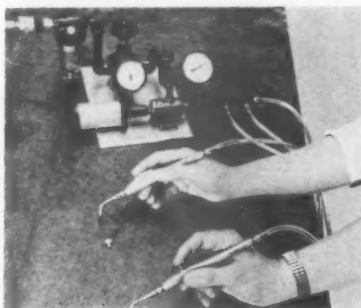
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factured to conform to government specifications.

Industrial Retaining Ring Co., 57 Cordier St., Irvington 11, N.J.

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PORTABLE VACUUM UNIT FOR DELICATE PARTS ASSEMBLY



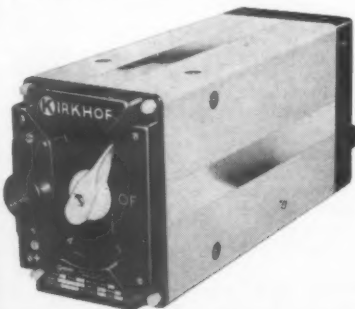
A portable vacuum unit has been developed for handling small delicate parts during assembly operations. In contrast to previous units which had to be assembled on the site by company engineering departments, the new 5-lb unit is a completely packaged product.

Mainbrace of the unit is an Air-Vac vacuum transducer which can pull air through 8 probes having tips with .032 openings while maintaining a vacuum of 5 inches of mercury. The unit also contains an air regulator which does sentry duty on the consumption of compressed air.

Air-Vac Engineering Co., Inc., Old Stratford Road, P.O. Box 27, Shelton, Connecticut.

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EPOXY-INSULATED WELDING TRANSFORMER LINE



A line of epoxy-insulated welding transformers is rated at 60, 70, 90 and 130 kva. Although thermal capacities of the four basic models based on the previous standard temperature rise of 85°C are 50, 60, 70 and 100 kva respectively, the epoxy insulation of the new epoxy-pak units makes a 110°C rise safe and practical for high production welding. With the higher ratings, the user gets a bonus of from 17% to 30% in usable, thermal capacity. Related benefits include longer operating life without maintenance or replacement and better, built-in protection against intermittent overloads.

- FASTER, EASIER INSTALLATION
- GREATER STRENGTH
- UNIFORM TENSION
- MAXIMUM SHEAR STRENGTH
- PRECISION FIT
- LOWER INSTALLED COST

Huck permanent fasteners are available in many types, shapes and sizes, from $\frac{1}{8}$ " to $\frac{3}{4}$ " diameter, to meet the requirements of all types of manufacturing, from railroad cars, trailers, buses, ships, blowers, appliances, to farm equipment and prefab buildings. These and many other users specify Huck fasteners for reasons of economy, speed of application, strength and dependability. You too, may find the answer to faster, better, cost-cutting assembly by investigating Huck's advantages. Write for literature, or ask for a Huck Sales Engineer who will be glad to explain the advantages of Huck Fasteners in your product. No obligation.

CL—
Commercial
Huckbolt

DR—
Daisy
Blind Rivet

PT—
Pull-Thru
Blind Rivet

OS—
Oversize
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Blind Rivet

MLS—
Mechanical
Lock Spindle
Blind Rivet

BL—
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MANUFACTURING COMPANY

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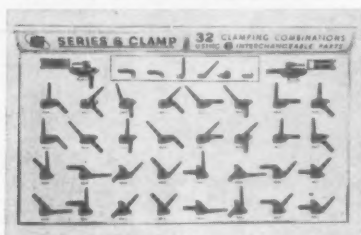
Of particular note is the new, largest capacity unit in the line, rated for 130 kva at 110°C temperature rise. It is the first welding transformer with this capacity ever offered in a compact package that conforms to RWMA and JIC cross-sectional dimension standards—9¼ inches in height, 7¼ inches in width. Over-all length is only 21 inches.

The method of impregnating the primary/secondary coil-and-loop assembly of the new transformers is an exclusive process. In addition to high thermal conductivity, the epoxy has advantages over insulating varnishes.

Kirkhof Mfg. Corp., 2450 Buchanan Ave., S.W., Grand Rapids 7, Mich.

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32 CLAMPING COMBINATIONS FROM 6 STANDARD PARTS



Six standard parts can be assembled into 32 different styles of clamps. The clamps are assembled by I.S.I. spline-

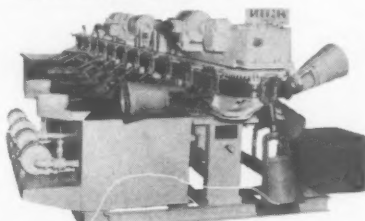
fit torque pins (of uniform length) and snap rings at all pivot points.

Components made of forged or cold rolled steel are interchangeable, making repair and tool-up quick and easy.

Industrial Specialties Inc., 22930 Sherwood, Warren, Mich.

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BARREL PLATING MACHINE FOR SMALL PARTS



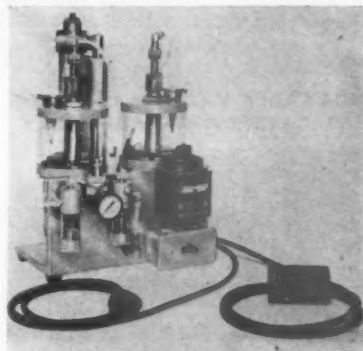
An automatic barrel machine plates and processes small parts. The unit is 4 ft. high and 6 ft. wide and features a selective skip-tank to permit elimination or addition of any processing step by simple mechanical adjustment.

The Little Steve automatically loads, unloads and cycles. Minimum anode and solution requirements are necessary for small batch plating and processing at a production rate.

Frederic B. Stevens, Inc., 1800 18th St., Detroit 16, Mich.

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UNIT MIXES, DISPENSES TWO COMPONENT ADHESIVES



A self-contained machine meters, mixes and dispenses two component plastic systems, such as epoxies.

The machine, which is easily adjusted to a range of cycles and materials, is designed to be used manually, or adapted to any automatic or semi-automatic production line.

Model 100 Nuplabond pumps a controlled amount of each component from its reservoirs to the mixing chamber. It then cycles itself through a controlled motor driven shear and agitation mixing operation, dispensing the measured mix with a drip-proof cutoff.

New Plastic Corp., 1026 N. Sycamore Ave., Los Angeles 38, Calif.

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What makes it RIGHT for you?

The right fastener for YOUR needs is one that is specifically designed, engineered and manufactured to meet your production requirements precisely. Fabricated from the most suitable metal and provided with the right finish, it must combine secure fastening with maximum speed and ease of assembly.

If you're looking for the right fasteners, Stanley-Humason has the engineering experience and ability needed to analyze your requirements and develop the best possible designs to meet them exactly... and the complete, modern production facilities needed to produce your fasteners efficiently and make prompt deliveries keyed to your own production schedules.

FOR ADDITIONAL INFORMATION... send for data sheets on Flat Spring, Retaining Ring, Hour Glass or Screw Machine Type Fasteners, and Special Application Nuts... or simply write, outlining your fastener requirements. Also available are data sheets on assembled products, metal stampings, screw machine parts and wire forms.

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A Subsidiary of The Stanley Works

Dept. J, 60 Stafford Ave.

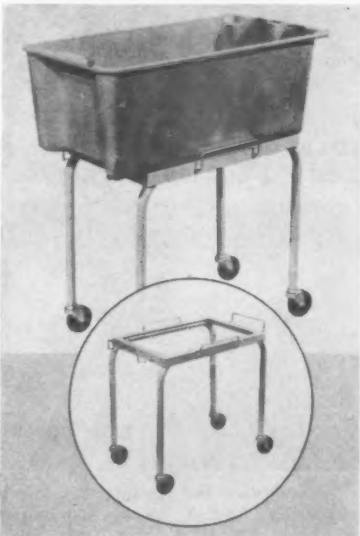
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SPRINGS • WIRE FORMS • STAMPINGS • SCREW MACHINE PRODUCTS • ASSEMBLIES

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ASSEMBLY LINE CARTS MOUNT TOTE PANS



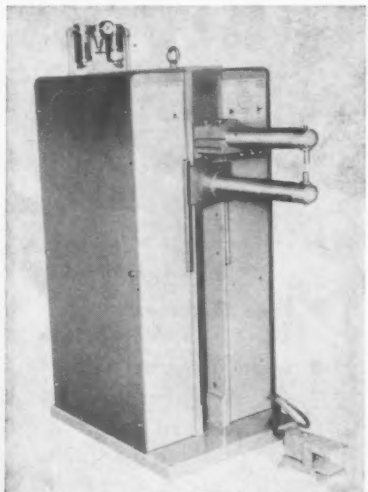
Pan carts for over-the-floor materials handling operations are easily positioned, at a convenient height, at machines. The new carts mount any of three standard Stack-n-Nest tote pans.

The carts are available with frame retaining brackets adjustable to handle all three size fiberglass pans, or with pre-drilled holes for permanent attachment. Frames are welded 1" steel tubing and angle, equipped with four swivel 3" diameter soft rubber casters with expansion socket and double ball raceways. Height is 21 3/4".

G. B. Lewis Co., Dept. BC, Watertown, Wisconsin.

Use postpaid card. Circle No. 18

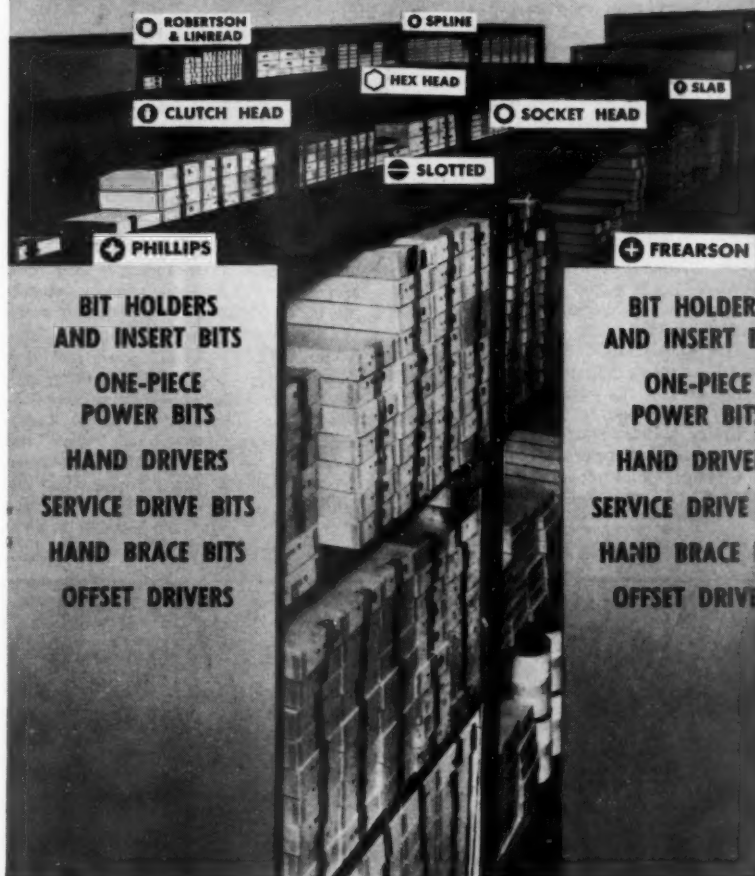
SPECIAL FEATURES NOW STANDARD ON SPOT WELDER



A spot welder can be converted to foot, air rocker or air press operations without drilling holes, welding or similar construction.

The Series 300, with rigid Uni-Strut construction, features throat design

A COMPLETE TOOL STOCKROOM YOU CAN KEEP ON YOUR DESK!



As quickly as turning a catalog page, you can order out any of the thousands of Apex screwdriving tools in this stockroom. Standard and magnetic tools . . . for all types and sizes of screws . . . for manual or power tool operation . . . they're all clearly listed in our Catalog 30-C.

Prompt delivery on all standard application tools; immediate attention to specials. For emergency rush orders, Apex representatives in most principal cities have a stockroom full of the most used screwdriving tools.

Reduce your tool inventory the safe way by making Apex your screwdriving tool stockroom. Write, on your company letterhead please, for Catalog 30-C.



APEX FASTENERS TOOLS
SCREWDRIVING • NUT RUNNING • SPECIAL

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which permits the user to adjust the arms to move in or out, up or down. Continuous heat control is a standard feature offering current adjustments from 100% down to 20%.

Dual voltage is also standard. The unit can be connected to either 220v or 440v service without replacing components. The transformer is insulated with Class H silicone.

Peer, Inc., 1200 Milton St., Benton Harbor, Michigan.

Use postpaid card. Circle No. 19

AIR VISE SPEEDS LIGHT ASSEMBLY WORK



Work holding tools have been developed for light drilling and tapping and assembly.

The Palmgren Model 121 has a jaw width of 1½", opening of 1½", depth of 1" and is 1¾" high. It is equipped with 1½" diameter stainless steel air cylinder with adjustable stroke. Any air supply will operate the vise.

Chicago Tool & Engineering Co., 8383 S. Chicago Ave., Chicago 17, Ill.

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RETRACTING BALANCE REELS SUSPEND PORTABLE TOOLS



Designed for suspending power tools and devices, two automatically retracting balance reels keep equipment within arm reach.

Model 700 BR is an electric reel with Underwriters' approved grounding type electric reel assembly. It eliminates the need for a separate wire cable and is available with or without a Twist-Lock connector permitting multiple tool use.

Model 700 CR suspends electrical and non-electrical devices and can be used with unwieldy air hose extension, parts

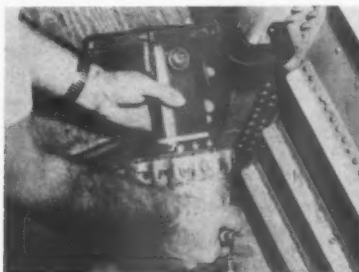
binds, equipment, etc., as well as heavier tools.

Cable tension can be adjusted from 0 to 9 lbs.

Cordomatic, 17th & Indiana Ave., Philadelphia 32, Pa.

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LOCKBOLT ADAPTOR FOR LIMITED-ACCESS FASTENING

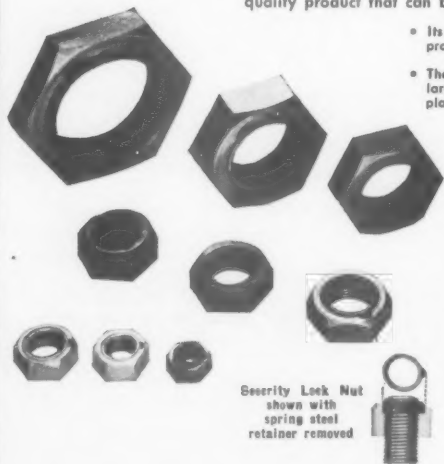


A new tool for making heretofore impossible limited access installation of Huck lockbolts has just been developed.

The T-90 Pull Yoke Adaptor permits the installation of 3/16" or ¼" tension and shear lockbolts in restricted areas, as well as enabling lockbolts to be used in those cases where stumps or bolts are made necessary due to limited clearance. It fits the Huck CP-353, Brown-Line T-90 Hydraulic

THE FINEST QUALITY IN A LOCKNUT MAKES A FINE PRODUCT FINER!

The Security Locknut is the finest thing in fasteners—a high quality product that can be a selling point on your equipment.



- Its finish adds to the appearance of any product—nothing to catch, tear or scratch.
- The nut is milled from the bar up to 2 in. In larger size they are hot forged. Plain or plated finishes can be furnished.

- The Locking Ring is made from the finest spring steel obtainable.
- Security Locknuts are made in a size range of ⅜" to 4".

The Security Locknut is a combination of a standard nut and the finest spring steel retainer. Security Locknuts require no bolt tension. They are self-locking and will stay in any position on the bolt. Nut and retainer act as a unit. The nut carries the load. The insert does the locking. It is installed like any ordinary nut with an ordinary wrench and it can be removed and replaced any number of times without losing its locking effect.

SEND THE COUPON
FOR MORE DETAILS.

Security

THE NUT YOU CAN'T SHAKE LOOSE

HOW IT WORKS!

Made of the finest spring steel available, the high-tension spring steel Locking Insert is elliptical in shape and is a permanent part of the Locknut. As the nut is wrenching onto the bolt, the spring steel is forced into round and grips the bolt with terrific tension. The nut will remain in place.

SECURITY LOCKNUT CORPORATION
NORTH AVENUE AT 19th AVENUE, MELROSE PARK, ILL.
Here is a drawing of our product. What self-locking fastener would you suggest?

Company Name _____
Address _____
Town _____ State _____
Signed _____ Title _____

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WIRING SHORT-CUTS POSSIBLE *Only* WITH

SERIES G **ALPHA BLOCKS**



...New Light Duty
Terminal Blocks

- Snap Together - Stay Together
- Small, Compact - Easy To Assemble
- Color Coded - Ten Standard Colors

Alpha Blocks (Series G), or entire circuits can be added or subtracted for experimental work. These blocks can be furnished assembled to your specific color combinations.

ALPHA ELECTRIC PRODUCTS CO.
3625 N. Halsted St. Dept. A-1060 Chicago 13, Ill.

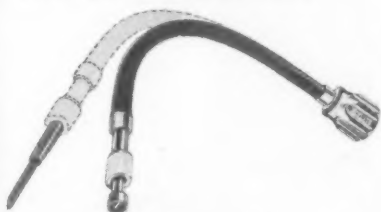
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Assembly and Fastener Engineering

Tool, and either the Townsend G-85 or G-86 Pull Guns.

Brown-Line Corp., 111 Main St., El Segundo, Calif.

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FLEXIBLE SHAFT DRIVER FOR AUTO COMPONENTS

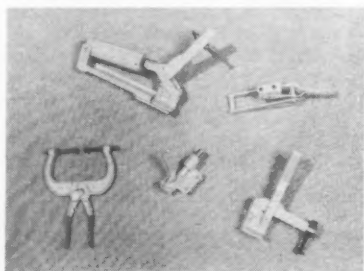


A flexible-shaft screwdriver makes hairline adjustments to carburetors and distributors. The Xcelite 112 has a plastic handle, plastic-coated steel shaft and two screwdriver bits. It is 14 $\frac{3}{8}$ " in length.

Xcelite, Inc., Orchard Park, N.Y.

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TOGGLE CLAMPS REQUIRE MINIMUM FORCE TO LOCK

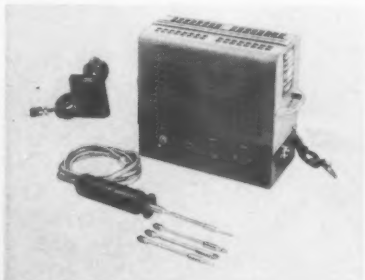


Toggle-action clamps are engineered to give positive action with a minimum of force for locking or unlocking. Push-pull clamps, portable clamps and air-operated clamps with pressures available from 200 to 1200 lbs. are also offered.

Universal Engineering Co., Frankenmuth, Mich.

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ULTRASONIC IRON SOLDERS WITHOUT FLUX



A new eight-ounce 10-watt ultrasonic soldering iron is capable of soldering a wide range of materials without flux.

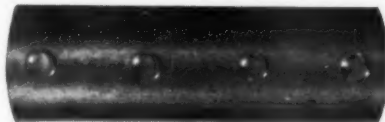
The new iron is designed for soldering semiconductor materials as well as metals such as aluminum, magnesium and their alloys, especially those characterized by very rapid surface

ALLEN



Allenpoint's deep, full-circle bite assures tremendous resistance to removal torque! Stays tighter longer!

When you need a set screw that you can depend on to stay tight under heavy strain and vibrations, specify ALLENPOINT. Here's why you can always depend on ALLENPOINT: proper design of the cup diameter results in a rugged grip that makes the full-circle pattern you see here... deep, strong, clean sockets allow full wrenching leverage... and uniform Class 3A threads assure a tight friction lock over the entire length of Allenpoint Set Screws.



Ask your ALLEN Distributor for samples and full engineering details—he's always ready, willing, and able to give you prompt, practical service!



ALLEN MANUFACTURING COMPANY

HARTFORD 1, CONNECTICUT, U.S.A.

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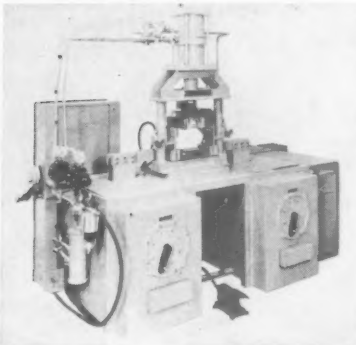
oxidation. The new unit completely eliminates surface pre-treatment as well as post-cleaning to remove flux.

Operating on normal 115-volt, 60-cycle power, the unit uses standard replaceable General Electric soldering iron tips of various configurations.

Vibro-Ceramics Div., Gulton Industries, Inc., 212 Durham Ave., Metuchen, New Jersey.

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PROJECTION WELDER FOR SEMI-CONDUCTOR INDUSTRY



Semi-conductor and transistor components can be encapsulated by resistance welding over a wide range of sizes (diameters from .3" to 1.25") on the model 2400 projection welder. This capacity range is realized by using

twin 75 kva transformers coupled to the welding head through balanced secondary circuits and a new welding head design.

The welding head features two column construction to eliminate deflection plus a low inertia force system utilizing anti-friction bearings, diaphragms and air regulators. The system has a special sequence to provide controlled approach that eliminates electrode hammer on the work.

The welding head is mounted on desk-type sub-base containing the welding transformers, electronic controls, pressure controls and main disconnect switch. This type of mounting facilitates the use of "drybox" or other type of controlled atmosphere enclosures. The components are located to provide room for a second operator's station at the rear of the machine if desired.

The welding force may be varied from 300 lbs. to 2400 lbs. and energized by 80 psi air. The controlled approach system motivates the electrodes so that they first contact the work with a "feather-touch" at which time the full force is applied and the weld sequence automatically initiated.

The two column construction assures that electrode parallelism is maintained within .0001 to .0002" on 1 1/4" diameter work at full force.

Thomson Electric Welder Co., 161 Pleasant St., Lynn, Mass.

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PARTS HANDLER FEEDS UP TO 90 FT. PER MINUTE

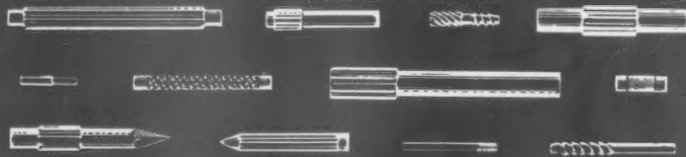
An automatic parts handling system can be adapted to any machine for manufacturing, assembly, counting, packaging or other applications.



The system includes a vibratory parts feeder, an "automator" to orient the parts, a vibrating storage-supply hopper which supplies the bowl on demand.

The feeder has a rate of up to 90 ft. per minute. Standard bowl sizes are 5, 8, 12, 18, 24, 30 and 36 inch diameters with either clockwise or counter-clockwise feed direction.

The bowl level limit switch, which actuates the storage-supply hopper bin vibrator, is adjustable to control any



JOB-DESIGNED THREADED PINS FOR EVERY INDUSTRY



Here is a fast, dependable, low cost, quality minded source of supply for JOB-DESIGNED threaded pins and fasteners of all types, in any metal, to fit your own particular assembly requirement. Recognize the fact that a fastener designed specifically to fill a seemingly complex assembly requirement can easily cost less than design modification to accommodate so-called standard fasteners. Assembly costs are a very major part of manufacturing expense. Most of this is labor. The fastening medium itself is usually a minimum item. If a Job-Designed fastener makes assembly simpler and faster, permits the use of fewer fasteners, allows the designer functional freedom and improves

product efficiency, yours is a specifying job well done. All these possibilities are available when you come to Hassall for design assistance and quotation on challenging, difficult or unusual rivets, threaded nails, drive screws and other cold headed parts. Short or long runs, pilot quantities, engineering counsel, over 100 years of intimate association with cold heading—and a deep appreciation and regard for the concept of value analysis—all are a part of the Hassall service to you.

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MANUFACTURERS SINCE 1850

JOHN HASSALL, INC.

P.O. Box 2217 • Westbury, Long Island, N.Y.

Use postpaid card. Circle No. 252

Torque Wrench Adapter Calculator Slide Rule



Free

Instantly calculates scale conversion factors for adapters of different lever lengths—set it and read it.

Provides automatic selection of proper torque wrench for adapters and/or proper adapters to go with given torque wrenches.

Sent free upon request, compliments of

PA **STURTEVANT CO.**
ADDISON / QUALITY / ILLINOIS

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Assembly and Fastener Engineering

NEW FROM GARDNER-DENVER

Series No. 1 reversible air-tool line
to speed production fastening



New Gardner-Denver Series 12E1R reversible screw drivers—both in-line and angle types—speed production fastening of machine screws No. 0 thru No. 6. Series 16E1R nut setters—in-line and angle—also available for machine screw nuts No. 0 thru No. 6.

Here's the new line of reversible air tools you asked for . . . one designed to make production screw driving and nut setting faster than ever before.

Reversible feature saves man-hours—assures accurate driving and setting. Permits tightening of both right- and left-hand rotation screws and nuts with only one tool. **Exclusive "suction pickup"** is designed especially for use with non-magnetic fastenings. Vacuum created in the finder or socket picks up and holds screw or nut prior to fastening.

Interchangeability Screw drivers or nut setters—both in-line and angle-types—are available with a complete selection of interchangeable attachments.

For further information consult your Gardner-Denver air-tool specialist or write for new bulletins.



EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curly Ave., Toronto 16, Ontario

Use postpaid card. Circle No. 254

required max.-min. depth of parts in the bowl.

General Automation, 2315 W. Magnolia Blvd., Burbank, Calif.
Use postpaid card. Circle No. 27

LOUPES CUT GLARE IN INSTRUMENT INSPECTION



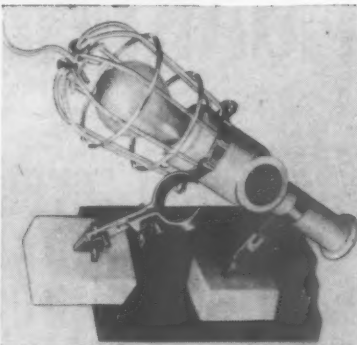
Loupes permit detailed inspection of highly polished parts and precision assemblies without annoying glare. A new series of Ray-Ban loupes have tinted lenses, ground and polished-to-curve.

Both available models are available in several focal lengths, with magnification of 4x or 7x.

Bausch & Lomb Inc., 626 St. Paul Ave., Rochester 2, N.Y.

Use postpaid card. Circle No. 28

MAGNETIC HOLDER FOR PORTABLE HAND LAMP



A magnetic holder can be used with many types of portable lights and sockets to make a light fixture of a portable head lamp anywhere there is an exposed steel surface. The ProTex has a magnetic holding power of over 60 lbs. on 1/8" steel on a straight pull rating.

Daniel Woodhead Co., 15 N. Jefferson St., Chicago 6, Ill.

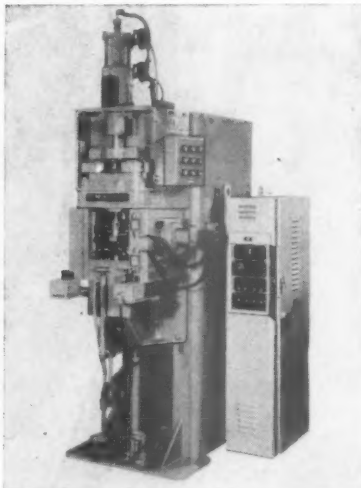
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MAGNETIC FORCE WELDER FOR NON-FERROUS METALS

A magnetic force welding machine makes full area percussion welds. While specifically designed for welding silver alloy relay contacts in motor starters,

the unit can be adapted to the other joining of non-ferrous metals.

Acro-Magnetic is rated at 100 kva and has DC holding coil delayed forge, diaphragm safety head and selective micro-switch firing features. It is tooled with a sound baffle cage and fum. exhaust system. Electronic welding control is synchronous with selective half



cycle and positive and negative heat control functions.

Acro Welder Mfg. Co., 1719 W. St. Paul Ave., Milwaukee 3, Wis.

Use postpaid card. Circle No. 30

Performance

- High-Speed Shavers
- Riveters
- Automatic Screw Machines
- Special Machines
- Duplex Spine Millers
- Spring Presses
- Drilling Machines
- Drilling and Tapping
- Fitting Machines
- Indexing Tables
- Metal Sawing Machines

At Townsend of Hartford, our greatest asset is the reputation we have for manufacturing machine tools that deliver constant, efficient, accurate PERFORMANCE. You can talk about engineering... about integrity... about craftsmanship... about prices... and about service, individually. But, when you put them all together, they add up to one word... PERFORMANCE. And that is what Townsend of Hartford gives you. Try us and see for yourself. We are no farther away than your telephone. Our consulting engineer will be happy to visit your office and explain how Townsend of Hartford can give you the PERFORMANCE you want.



TOWNSEND OF HARTFORD

QUALI-MATIC MACHINES

THE H. P. TOWNSEND MANUFACTURING CO. • BROOK ST., WEST HARTFORD 10, CONN.

Use postpaid card. Circle No. 255

Representatives Wanted

Excellent commissions. Prefer men allied with fastener industry.

Write

T. N. F. Corp

Box 132, Linden, N.J.

for full details

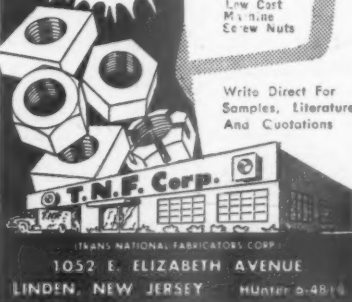
NUTS

For
ECONOMY &
EFFICIENCY

STANDARD
SINGLE-
CHAMFER
DOUBLE-
CHAMFER
SMALL
PATTERN
LARGE
PATTERN
SPECIALS

Low Cost
Mix-line
Screw Nuts

Write Direct For
Samples, Literature
And Quotations



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Assembly and Fastener Engineering

VIBRATORY FEEDER FOR PARTS TO 1/2" LENGTH

PARTS FEEDERS



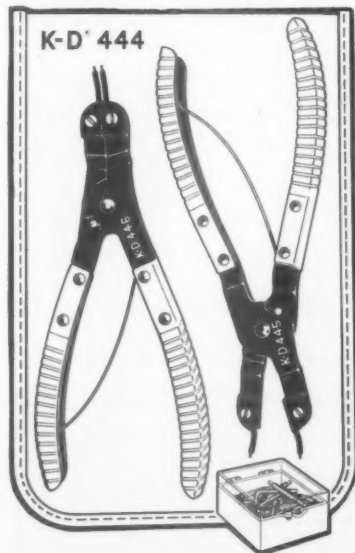
A vibratory parts feeder is designed for parts of less than 1/2" in length.

The unit is complete with built-in control and interchangeable bowl of 7" diameter. Over-all height is 6 1/2" and mounting base is 8" square. Design is similar to the standard 11" model which allows easy orientation.

Burklyn Co., 3429 Glendale Blvd., Los Angeles 39, Calif.

Use postpaid card. Circle No. 31

SNAP RING PLIERS WITH INTERCHANGEABLE POINTS



Using 12 different types and sizes of interchangeable points, a wide range of applications can be handled with two pliers (No. 444) for internal and external snap rings.

Hex points are automatically aligned and secured in the hex jaws of the pliers. Locked by a screw on each jaw plate, the points cannot twist. The pliers are 6 3/4" long with firm-grip handles.

K-D Mfg. Co., 526 N. Plum, Lancaster, Pennsylvania.

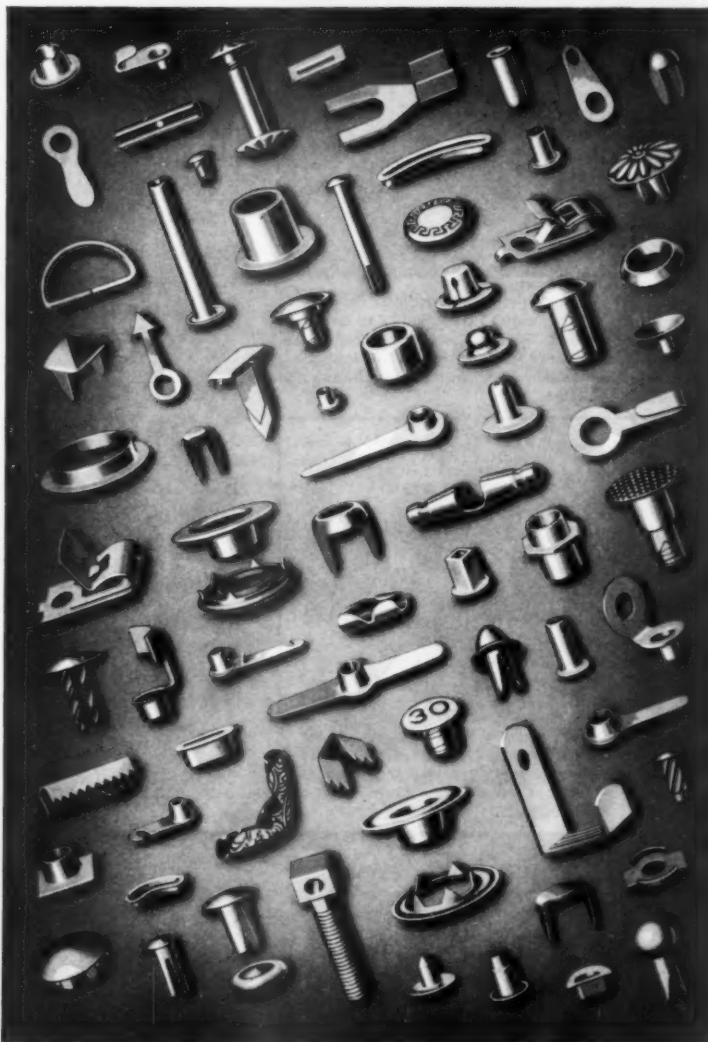
Use postpaid card. Circle No. 32

NOWHERE IN THE WORLD WILL YOU FIND SUCH A VARIETY OF FASTENERS UNDER ONE ROOF

**EYELETS, RIVETS, GROMMETS, WASHERS, HOLE PLUGS
SNAP FASTENERS, FERRULES, TERMINALS, STAMPINGS**

and many similar fasteners are made in enormous variety and quantity. Made from most any metal and in all finishes. We also make a complete line of machines for attaching eyelets, rivets, etc.

Send for our general catalog which illustrates over 1000 metal articles.



84 FRANKLIN AVENUE

EDWIN B.

84 FRANKLIN AVENUE

TRADE MARK

STIMPSON

MADE IN U.S.A.

BROOKLYN 5, N.Y., U.S.A.

COMPANY.

BROOKLYN 5, N.Y., U.S.A.

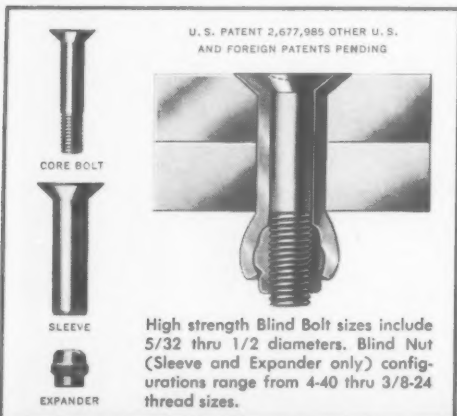
84 FRANKLIN AVENUE, BROOKLYN, N. Y.

Use postpaid card. Circle No. 257

SONIC VIBRATION PROBLEMS ON DC-8 SOLVED BY BLIND BOLTS



Above photo shows portable electric-hydraulic Power Unit (3000 psi max....110 v. source) actuating hand held Gun to drive 1200 Blind Bolts in each Ejector and Thrust Brake. Air-Hydraulic Power Units are safely used in flight ramp areas for repairs on fueled aircraft. Hand installation tools are also available.



Blind Bolts were finally selected by Douglas DC-8 engineers for use in the Sound Suppressors. Exhaustive tests of various blind fasteners determined that Blind Bolts in temperature areas could best resist overall sound pressure levels reaching 150 decibels!

In this unusual application, the remarkable ability to the Blind Bolt to resist sonic vibrations stems from several of its inherent design features...the *twin locking technique*, combining the oval lock of the Expander to grip the thread of the Core Bolt and the wedge lock between the Expander and Sleeve end...the *hole filling ability*, resulting from the expansion of the Sleeve shank during the installation pull-up of the Expander into the Sleeve end...and lastly, the *excellent fatigue resistance*, gained from the high tensile preload imposed by the Core Bolt and from the cushioning effect of composite fastener materials.

Because the coefficient of expansion must remain the same to prevent loss of fastener preload, the compatibility of structural materials at high temperatures is essential. Inside the stainless steel Ejector where exhaust gases reach 900°F., A-286 stainless steel Blind Bolts are used. On the outside where structural temperatures reach 300°F., Type 431 stainless steel Blind Bolts are used.

From the shop viewpoint, Blind Bolts are installed rapidly and quietly. Hole preparation is simple, no reaming is required. Only Blind Bolts offer a choice of gun driving tools designed for repairs or modifications in difficult or tightly congested structural areas.

If sonic vibration is your fastener problem...consider Blind Bolts. Write for brochure.

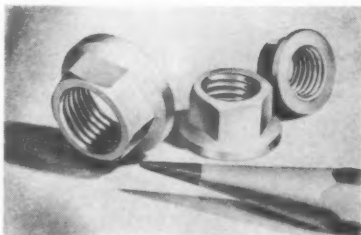
hi-shear CORPORATION

2600 WEST 247th STREET, TORRANCE • CALIFORNIA



WHAT'S NEW IN FASTENING AND JOINING

For further information on any of the fasteners or methods listed here, use the handy postpaid card opposite page 82.



(See 50)

RATE LIGHTWEIGHT LOCKNUT AT 145,000 PSI, 1000°F

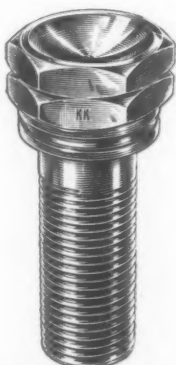
FN 1014 locknut is a 1000°F, 145,000 psi rated fastener exceeding the standards of NAS 1291C in tensile strength, maximum usage temperature, magnetic permeability and locking torque.

It has a reduced-height hex wrenching area designed for minimum mass. It can be installed close to perpendicular bulkheads, making smaller and thinner flanges possible.

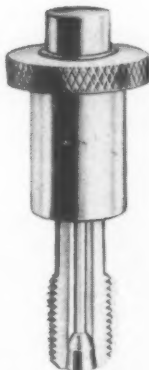
Forged from A-286, the nuts are silver plated to AHS 2410 standards. An alternate series, FN 1014M, finished with molybdenum disulfide dry film lubricant, is intended for electronic industry uses. Both fasteners are made in standard Class 3B sizes from No. 4-40 through 3/8"-24.

Standard Pressed Steel, Jenkintown, Pennsylvania.

Use postpaid card. Circle No. 50



(See 54)



(See 52)

CAN MIX EPOXY ADHESIVE THICK AS PUTTY OR TO FLOW

A two-part adhesive mixes easily and does not require accurate measurement in mixing. Epoxy-Metal will bond metal, wood, concrete and many problem surfaces. It can be mixed as firm as putty or so thin that it flows into cracks.

Wilhold Glues, Inc., 2943 W. Carroll Ave., Chicago 12, Ill.

Use postpaid card. Circle No. 51

THREADED BOLT WITH QUICK RELEASE PIN

A new fastener is reported to be the first design ever to combine the threaded advantages of a bolt with the features of a quick disconnect fastener.

This fastener, for tension applications, was developed to be used in tapped holes or nut plates wherever speedy assembly or disassembly is necessary.

Bolts are engaged or disengaged by releasing or depressing a button that operates a spring-loaded mandrel. The mandrel maintains a positive locked-in contact between threads of tapped

hole, or nut threads, with threads on quick-release bolt. The parts are available in alloy or stainless steel, in 5/16", 3/8" and 1/2" sizes.

Avdel, Inc., 210 S. Victory Blvd., Burbank, Calif.

Use postpaid card. Circle No. 52

ADD LARGE DIAMETER SIZES TO LOCKING BOLT LINE

Fasteners of 3/8" and 1" diameter size are being added to a line of locking bolts. The line of medium carbon steel and aluminum alloy Huckbolts now covers a range of 5/32" through 1".

The new fasteners, a two-piece combination of rivet and bolt features, are designed for bridge and building construction and for transportation industries. Expansion of the line involved designing an installation tool with pulling force in excess of 37 tons. The portable hydraulic tool weighs about 37 lbs.

Huck Mfg Co., 2480 Bellevue Ave., Detroit 7, Mich.

Use postpaid card. Circle No. 53

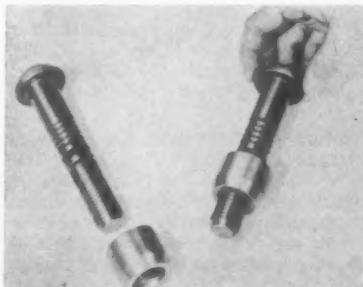
LOCKING CAPSCREW WITH HIGH TENSILE STRENGTH

A self-locking capscREW with high tensile strength has a configuration of a conventional hex head capscREW with a double cap, a concave head; and a seating-type, all metal, reusable locking collar.

When the stud is pulled down and the proper torque is applied, the collar compresses, causing the inside of the collar to move in and lock radially and axially on the stud shank and cap shoulder.

When the cap picks up all the load it can carry, the concave configuration of the cap permits it to adjust to the torsional load equalizing the stresses and applying constant pressure through the elasticity in the cap design. More wrench torque can be applied before exceeding the elasticity of the stud. The elasticity of the Kapscrew is more than three times that of conventional capscREWS.

Current head style available is stand-



(See 53)

THE PIONEERS OF FUNCTIONAL PACKAGING...



NOW bring you LOCK WASHERS WITH



Applied by the
"3M" Mechanical
Plating Process



Mellows . . . first to give you lock washers in Coin Pak, in 2-way Telescope Cartons, and in JOB-PAK . . . has adopted the New 3M Mechanical Plating Process recently perfected by Minnesota Mining and Manufacturing Co.

2 Great Gains!

DYKO Metal Plating results in these advantages:

1. It gives M-C Lock Washers a heavier coating of protective plating (.0003 minimum) at no increase in price.
2. It eliminates the possibility of hydrogen embrittlement . . . always present when plating is done by the standard electrolytic process.

You gain these advantages, plus the advantages of Mellows Functional Packaging and Mellows Money-Saving Service Policies . . . when you specify . . .



143 E. Nash St. Milwaukee, Wis.

Manufacturers of a Complete Line of Lock Washers in all Standard and Special Sizes, Non-Ferrous and Plated in Bulk, Conventional Packages, Special Packages, Coin Pak and Job-Pak.

AB490-1/2-A

Use postpaid card. Circle No. 259

ard hex head. 12-point heads and internal wrenching heads will soon be available.

Klincher Kapscrew, Inc., Dept. SLK-766, 2153 Hillside Ave., Indianapolis 18, Indiana.

Use postpaid card. Circle No. 54

ADHESIVE FOR DRY-BONDING PLASTICS, FABRICS

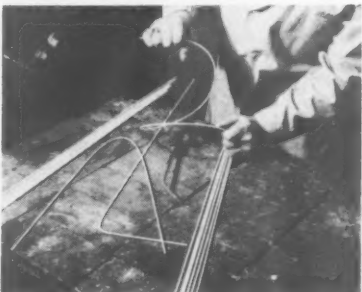
Vinylstix Heat Seal is a water-based adhesive for dry-bonding supported and unsupported plastics, acetate, wool, leather, paper and other materials.

Materials coated with the adhesive may be stacked and die-cut when the adhesive dries, for bonding immediately or at a later date. Heat applied will form a permanently-flexible bond instantaneously. The adhesive can also be used as a wet stick adhesive.

Adhesive Products Corp., 1660 Boone Ave., New York 60, N.Y.

Use postpaid card. Circle No. 55

TWO TYPES OF FLUX-COATED BRONZE BRAZING RODS



Two bronze brazing rods with extruded flux coatings have been developed: a thin-coated rod for high-speed production lines and an all-around heavier-coated maintenance rod.

Rods available in four sizes offer the user just the right amount of flux for all brazing operations. The non-fuming, non-charring flux will not crack off the rod even when the rod is bent over 360°. Allowable storing time is unlimited.

All-State Welding Alloys Co., Inc., 249 Ferris Ave., White Plains, N.Y.

Use postpaid card. Circle No. 56

PLATING LENGTHENS FASTENER REUSABILITY

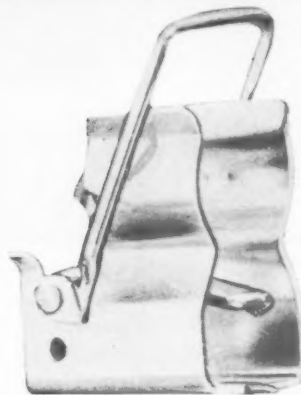
Kayplate No. 2 permits 66% more reusability of fasteners after their exposure to temperatures in the 1200°F to 1400°F range. This was established during tests when engine nuts, coated with the plating were subjected to temperatures up to 1600°F for two hours in a test oven.

The new development will aid in the fabrication of the company's line of high temperature nuts.

Kaylock Div., Kaynar Mfg. Co., Inc., Pico Rivera, Calif.

Use postpaid card. Circle No. 57

LOCKING CLIP HOLDS ELECTRONIC COMPONENTS



A positive-action locking clip has been designed to hold fuses and other small electronic components against shock, vibration and g-forces.

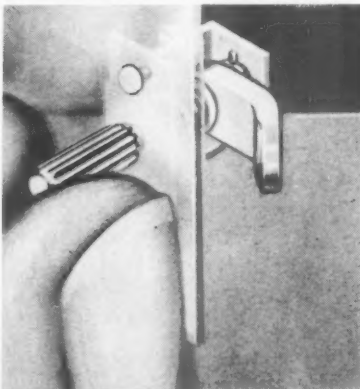
The clip is available with an ejecting spring of 18-8 stainless steel, which automatically expels the component when spring tension is released—eliminating the need for fuse pullers. There are also non-ejecting springs.

Ferrules diameters of 13/32" to 1-1/8" can be accommodated. The clip is of spring temper phosphor bronze with an optional solder-position lug.

Atlee Corp., 47 Prospect St., Woburn, Massachusetts.

Use postpaid card. Circle No. 58

MINIATURE PAWL FASTENER IS ADJUSTABLE, ONE-PIECE



Built to accommodate any door or frame thickness varying from 11/64" to 19/64", a miniature pawl fastener extends into the enclosure only 15/32". The knob extends out of the panel only 1/2", measured from the inside panel surface.

The No. 27 adjustable pawl fastener is delivered as an assembled unit to save assembly time. Two drilled or punched holes are required to mount the housing on the door with bolts or rivets as conditions dictate. It may also be welded. A third hole accommodates the knurled knob. One-quarter turn locks the fastener. Further

Assembly and Fastener Engineering

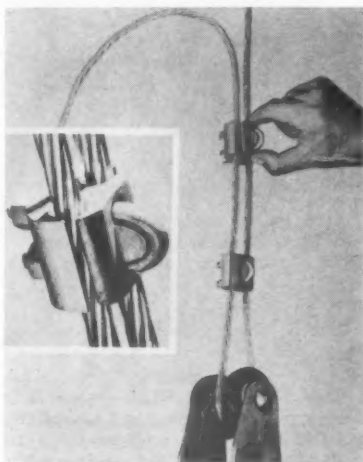
turning tightens the door against vibration.

All parts are steel, cadmium-plated. The knurled knob is bright cadmium finished. Each assembly weighs only .011 lbs. A sub-assembly weighing .009 lbs is also available for use with the buyer's own knob.

Southco Division, South Chester Corp., Industrial Hwy., Lester, Pa.

Use postpaid card. Circle No. 59

LOOP DEADEND CLIP SPEEDS CABLE ASSEMBLY



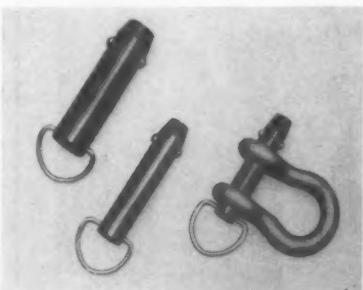
A new clip offers quicker loop dead-end installation on electrical power lines. By rotating the U-bolt 90°, installation convenience is increased.

The aluminum clips need never be disassembled for installation, eliminating loose parts and pole-top reassembly of components. The 2412 design may be used on loops formed over either spools or thimbles. It is used on ACSR from No. 4 through 1/0 and for stranded aluminum conductor of comparable diameter.

Rome Cable Div., Aluminum Company of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.

Use postpaid card. Circle No. 60

QUICK RELEASE PINS HOLD IN OVERSIZED HOLES



Quick release pins are designed with extra-large stainless steel lock buttons; activated by siliconized rubber, which will hold against vibration even in oversized holes. Alignment is made easier by a solid tapered end.

If your fastening problem is listed here, National has the answer you want!

Low first cost. National will lease or sell riveting equipment to put you in production fast at extremely low cost.

Flexibility. National Equipment is easily set up for new jobs at very little expense. National Equipment practically eliminates obsolescence.

Ruggedness. National riveters are built to give you dependable service year in and year out.

Low maintenance. National Equipment is noted for the ability to work

around the clock schedules with little or no major maintenance even after years of service.

Unskilled operators. National Riveters eliminate the need for hiring skilled operators. It is surprising how fast and how easily employees gain the little skills needed for profitable riveting.

Inspection. National Riveting makes possible inspection right at the riveter. A glance tells the operator that the fastening job is correct.



National Semi-tubular Rivets Give You the Lowest Cost In-Place Fastening!

"Fastening automation" costs surprisingly little with National equipment and semi-tubular rivets.

In addition, riveting equipment can be quickly installed with a minimum of plant disturbance and immediate production and cost improvement.

The National Plan For You

Find out today how quickly you can shift to money saving National riveting. National will fit riveting equipment to your requirements and your budget.

Send a blue print or your actual fastening job to National today. There is no obligation. You'll get the answers you need promptly.

NATIONAL RIVET & MFG. CO.

211 Main St.
Waupun, Wisconsin,
U. S. A.



NATIONAL RIVETS

TUBULAR, SPLIT, SOLID ALL METALS

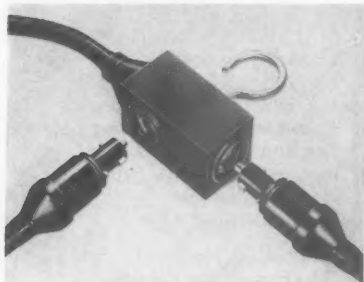
Use postpaid card. Circle No. 260

Eco-Pins are available in sizes from 1/4" and up in stainless steel, naval bronze, or plated steel. They can be used as clevis pins, as chain and anchor shackle pins, safety-lock pins or shear-load pins, or wherever a quick-connect and disconnect pin is required.

Waldick Engineering Co., Box 398, Huntington Station, Long Island, N.Y.

Use postpaid card. Circle No. 61

LOCKING CONNECTIONS ARE AIR, WATER TIGHT



Explosion-proof receptacles, connectors and distribution blocks are designed for one, two, four or six plugs.

The line features an air and water tight connection that is not energized until the plug is twisted and locked in the receptacle.

Cam-Lok Div., Empire Products, Inc., Box 98-T, Cincinnati 36, Ohio.

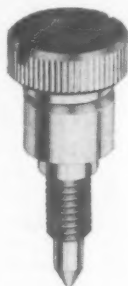
Use postpaid card. Circle No. 62

CAPTIVE SCREW FOR THREE PANEL THICKNESSES

A captive panel screw assembly for panel thickness of 1/16", 1/8", and 3/16" is made of corrosion-resisting steel, class 303 (class 303 SC) per QQ-S-763B with a No. 10-32 NF-2 thread. The head of screw No. 1805 is polished and slotted with a medium straight knurl side and passivate finish. The captive panel screw bushing is brass per QQ-B-626a, Comp. 22 1/2 hard finished with light polish and .0005" nickle plate.

Cambridge Thermionic Corp. 445 Concord Ave., Cambridge 38, Mass.

Use postpaid card. Circle No. 63



IMPROVE SELF-FLUXING SILVER BRAZING RODS

Self-fluxing properties of Silvaloy 15 and Silvaloy 5 silver brazing rods have been increased by improvements in the surface finish.

While paste fluxes may be used with these alloys, self-fluxing ability makes them useful in silver brazing of joints where complete flux removal is difficult and important.

Silvaloy 5 consists of 5% silver, 88.75% copper and 6.25% phosphorus. Silvaloy 15 is 15% silver, 80% copper and 5% phosphorus.

Engelhard Industries, Inc., 75 Austin St., Newark 2, N.J.

Use postpaid card. Circle No. 64

INSERT TOOL KIT FOR THREAD REPLACEMENT



Prepared to easily replace stripped-out threads with Hi-Shear threaded inserts in plate or cast aluminum, mild steel, magnesium and cast iron, is a new Insert Tool Kit.

The Hi-Shear type insert is installed in a drilled hole. No special counter-boring or tapping is required.

The SK110 and SK111 series kits each provide a simple hand tool which is used with open end wrenches to install self-locking threaded inserts. The kits additionally provide ten in-

Something **NEW** you should know about!

FEEDMATIC-DETROIT AUTOMATED EQUIPMENT

Now, you can speed small parts production and cut costs with new Feedmatic electrically controlled machines. These units automatically and continuously feed, inspect, segregate or assemble parts at greater efficiency . . . reduce handling costs on high volume operations. Use Feedmatic automated machines separately or for high speed delivery to machine tools, heat treating furnaces or final assembly areas.

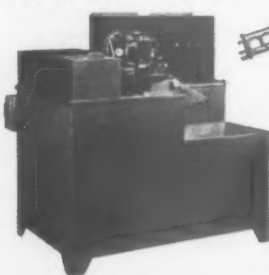
If your operation involves the manufacture or processing of parts in volume quantities, it will pay you to investigate the cost saving advantages of Feedmatic automated equipment. *Send us your problem today!*

FEEDMATIC-DETROIT, INC.

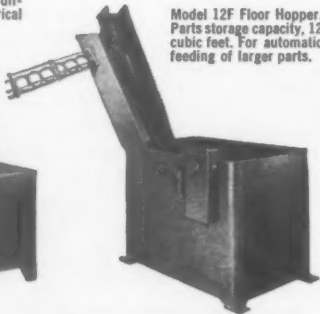
P. O. Box 42

• Detroit 40, Michigan

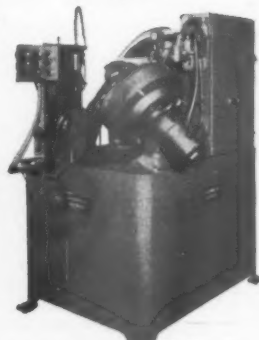
Automatic Gaging Machine measures and sorts parts. Adjustable stops, anvils and gage heads to facilitate change over to different size parts. Tolerance of electrical gages adjustable from .0005 to .020.



Model 12F Floor Hopper. Parts storage capacity, 12 cubic feet. For automatic feeding of larger parts.



Rotary hopper unit. Fast, efficient parts feeding. Available in sizes from 8" to 24". Feed tracks engineered to meet specific job conditions.



Special machine for automatically assembling automotive components.

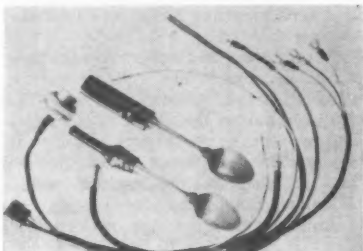
serts of a specified thread diameter to match the mandrel size of the hand tool. Installation instructions are included.

Kits are available for S110 fine thread and S111 coarse thread inserts ranging in thread size from 8-32NC thru $\frac{1}{8}$ -16UNC and $\frac{1}{8}$ -24UNF.

Hi-Shear Corp., 2600 W. 247th St., Torrance, Calif.

Use postpaid card. Circle No. 65

NEW CABLE ASSEMBLY WIRE HARNESS METHOD



A new method of wire harnessing and cable assembly combines the advantages of electrical tape and abrasive-resistant insulated sleeving.

Using special vinyl tubing which, when cured, contracts tightly around the encased wires, assemblies are made up with the characteristics of custom-made cable. The tubing is also available cut to desired lengths with special instructions provided for those assembling their own harnesses.

Sleeving is available pre-stamped with cable identification. Other uses of the pre-cut lengths include sleeving over terminals and wire connections, protecting small irregularly shaped components and insulation of any material where a tight fit is necessary.

Foley Electronics Co., 4810 Calvert Rd., College Park, Md.

Use postpaid card. Circle No. 66

ONE-PART EPOXY ADHESIVE FOR PRODUCTION BONDING

A one-part, 100% solid, thixotropic, free flowing epoxy adhesive is designed for production assembly operations. Meta-Bond 331 cures at moderate temperatures, requires no mixing or metering and maintains a six month (minimum) shelf life at room temperature.

The adhesive bonds metals, glass, ceramics and most plastics. Bonded aluminum has a shear strength exceeding 3000 lbs. psi. Typical lap shear strength brass to brass is 1850 lbs. psi. It passes MIL-I-16993C for thermal shock and has a Barcol 48 rating for hardness.

Meta-Bond 331 is stable at room temperature yet cures in 150 minutes at 250°F or 15 minutes at 350°F.

The adhesive resists most acids, alkalis and solvents. It can be safely used at operating temperatures of from -70°C to 175°C. Since it is internally resilient, thermal shock does not produce cracking. Volume resistivity of

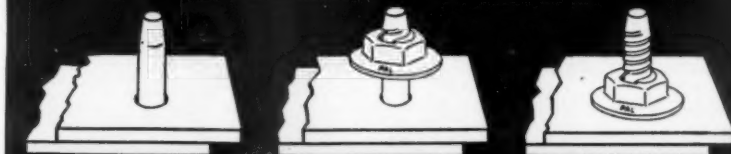
Save Threading Costs!

GET YOUR THREADS FREE

by fastening with

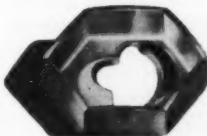
PALNUT® SELF-THREADING NUTS

Automatically form deep, clean threads while turning on unthreaded studs, rods, wire and pins



WASHER TYPE—STYLE SD

One-piece self-threading nut performs functions of ordinary nut, lockwasher and flat washer. Resilient washer base avoids distortion of sheet metal or damage to fragile parts. Several base diameters; also with bonded-in plastisol compound to seal out water and dirt. Sizes for $\frac{1}{8}$ ", $\frac{1}{32}$ " and $\frac{3}{16}$ " dia. studs and rod.



REGULAR TYPE—STYLE SR

For assemblies where space is limited. Uses shorter studs, less seating area. Competitive with push-on fasteners, assemblies fast, assures tight assemblies. May be used with internal wrench. Sizes for $\frac{1}{8}$ ", $\frac{1}{32}$ " and $\frac{3}{16}$ " dia. rod, in various hex widths.



ACORN TYPE—STYLE SC

Decorative, dome-shaped self-threading nut covers end of studs or rods to protect against scratching, snagging or tearing, while adding a pleasing appearance. Costs less than threaded cap nuts. Sizes for $\frac{1}{8}$ ", $\frac{1}{32}$ " and $\frac{3}{16}$ " dia. studs and rods.

Write for Bulletin 585-A and Free Samples, stating style, size and application.



THE PALNUT COMPANY

Division of United-Carr Fastener Corp.

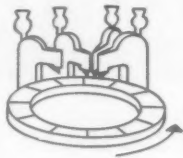
79 Glen Road, Mountainside, N.J.

Canada: P. L. Robertson Mfg. Co., Ltd., Milton, Ont.

LOCK NUTS and FASTENERS

**A FEW OF MANY POSSIBLE RIVETING
HEAD POSITIONS THAT CAN BE USED**

Rotating fixture
showing suggested
arrangement of riv-
eting heads.



Riveting heads can
be positioned for
fastening on flat or
curved assemblies.



Conveyor Belt per-
mits multiple set-
ting on both sides of
an assembly.



Sliding fixture used
for riveting 2 sides
of an assembly.



AUTOMATE RIVET SETTING for new low costs

For years assemblies made of metal and non-metal or a combination of both have been fastened most economically with semi-tubular rivets. And now even lower costs are possible with the thin-nose riveting heads designed by Chicago Rivet. These heads, pneumatically operated but electronically controlled, can be grouped in clusters on one or more planes and will set rivets as close as $\frac{1}{16}$ " apart. Automation, thru rotating sliding or continuous belt feeding and riveting stations, is possible. Riveting heads may be repositioned and used again on new assemblies.

CUSHIONED RIVETING REDUCES BREAKAGE

A pneumatic riveter upsets the rivet with a squeezing action which minimizes breakage and automatically compensates for slight variation in assembly thicknesses.

The suggestions of Chicago Rivet fastening specialists will prove most helpful. Call them—no obligation.



AIR-POWERED RIVETING CATALOG contains description and specifications of 8 single and multiple riveters—also rivet setters designed for automation.

RIVET CATALOG describes 1388 standard tubular and split rivets and 25 single and multiple motorized automatic rivet setters.

Chicago Rivet & MACHINE CO.

946 So. 25th Ave., Bellwood, Ill. (Chicago Suburb) • Branch Factory: Tyrone, Pa.

Use postpaid card. Circle No. 262

10¹⁶ ohm-cm makes the product suitable in electronics applications. Evaluation kits are available at \$9.75.

Mereco Products Div., Metachem Resins Corp., 530 Wellington Ave., Cranston, R.I.

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4043 ALUMINUM FUSION WELDING WIRE

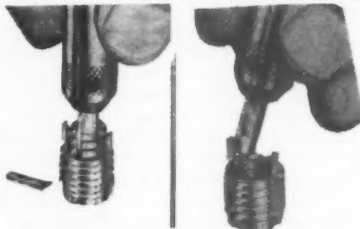
A 4043 aluminum welding wire is specifically designed as an all-purpose filler metal for both gas and electric fusion welding. Its principle alloying element is 5% silicon. It will join most aluminum alloys including 5052, 6053 and 6061 wrought alloys and cast aluminum alloys.

It produces a wider solidification range because it has a lower melting point than most aluminum alloys. This feature enables the metal to fill solidification voids without setting up stresses in the parent metal. Stresses are relieved in the molten welded filler and not in the joined parts.

American Brazing Alloys Corp., P.O. Box 11, Pelham, N.Y.

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REPLACE LOCKING INSERT THREADS WITHOUT DRILLING



Thread replacement without drilling can now be accomplished with the new Keensert self-locking replaceable sleeve insert.

The inserts are externally threaded right at the top, to provide maximum pull out resistance. Positive mechanical lock against rotation is provided by keys, which are tightly fastened in the inserts, and are pressed into the parent material with a small punch and hammer or a simple installation tool.

The replaceable sleeve is externally threaded for assembly into the shell and internally threaded for bolt attachment. The sleeve is locked against rotation within the shell by a key which will not come loose of its own volition, but may easily be removed for sleeve replacement.

The internal threads are available with a prevailing torque type lock which meets the values of Table III, MIL-N-250027 (ASG), or a free-spinning type lock which permits the bolt to be freely run into the insert until the head of the bolt bottoms on the plate being fastened. Then wrench torquing, which preloads the joint, causes the insert sleeve to compress (collet fashion), securely locking the bolt. At disassembly, the bolt can be uncrewed by hand after breakaway with a wrench.

Newton Insert Co., 6500 Avalon Blvd., Los Angeles 3, Calif.

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assembly and fastener engineering

OCTOBER, 1960

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EDITORIAL ITEMS									
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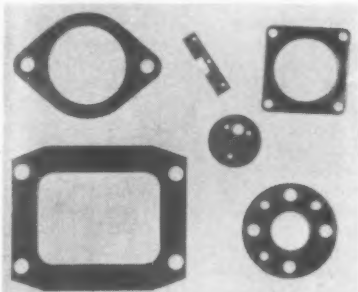
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CUT-TO-SHAPE, DRY ADHESIVE PREFORMS



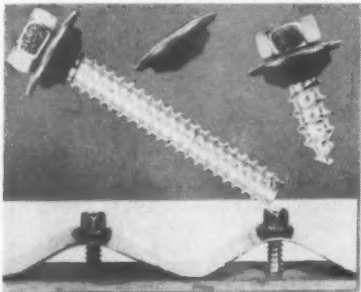
Sheets of dry adhesive film have a paper interliner which permits accurate die-cutting or preforming to desired shapes. The 2-mil film has a visible effective adhesive layer that allows the user to apply the right amount of adhesive for each joint.

The film gives excellent uniformity of thickness at the glue line. It eliminates solvents and facilitates inventory control. Optimum application conditions are: glue line temperature, 325°F to 350°F; pressure, 100 to 2000 psi; time to effect bond, 10 to 20 minutes.

The Auburn Mfg. Co., Middletown, Connecticut.

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TAPPING SHEETING SCREWS WITH NEOPRENE WASHERS



A washer and self-tapping screw assembly is designed to assure a tight, insulated seal for all types of industrial roofing and siding, including asbestos and protected metal.

The assembly incorporates a contoured molded neoprene washer bonded to a conical-dished metal washer. The contoured shape concentrates the heaviest neoprene section around the screw shank, so that when the screw is driven, the neoprene is forced into the hole around the screw shank.

The design prevents extrusion beyond the washer edge, improving appearance of the structure, and protecting the neoprene washer from deterioration due to sunlight. The contoured gasket reduces the amount of torque required to effect a permanent seal and prevents scoring and scuffing by eliminating metal-to-metal contact.

Self tapping screws are available in type 305 stainless, or carbon steel cadmium plated. The washers are available in hot galvanized steel, (302) stainless, (430) stainless or aluminum. Standard

It would take you over three months to walk past Harper's complete stock of **corrosion-resistant fastenings...**



Harper manufactures and maintains the world's largest stock of standard and non-standard fasteners in Stainless Steel, Brass, Monel, Silicon Bronze, Naval Bronze, Aluminum, Copper, Titanium, and other corrosion-resistant alloys. Harper's operation is complete—from elements, billets and extruding to rolling and fabricating parts—uniform quality control that assures you of the finest parts that money can buy, yet includes the economies that only an integrated operation can realize. This is another important difference that separates Harper from other fastener companies all over the world. Harper distributors everywhere maintain complete stocks for immediate delivery. See your Yellow Pages.

Write for your free copy of new, factual,
informative 24-page "CORROSION GUIDE."



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sizes are No. 14 diameters, Type A and Type B, in lengths from $\frac{3}{8}$ in. through (6-) in. The sheet metal screws are the indented hexagon head type for fast power tool application, and are supplied with the washers assembled. Samples.

Atlas Bolt and Screw Co., 1140 Ivanhoe Rd., Cleveland 10, Ohio.
Use postpaid card. Circle No. 71

ROSIN TYPE SOLDER FLUX FOR ELECTRONIC USE

A mildly activated rosin type flux has been tested neutral both before and after soldering, making it acceptable for electrical and electronic work where non-conductive, non-corrosive flux residues are required.

The Fusion RU series makes possible much more rapid soldering than had previously been possible with neutral fluxes—as much as 100% in some cases.

A possible secondary advantage to the production speed up is the lack of flux removal after soldering. Humidity chamber tests have definitely determined that the flux is non-corrosive after soldering and thus suitable for fine electronic component soldering.

In addition a wide range of metals is easily wet by this flux. Included metals are mild steel, brass, copper, tin, lead, cadmium, and silver plate.

Fusion Engineering, 1791 Roseland Ave., Cleveland 12, Ohio.

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DISCONNECTABLE, THREADED FITTING HAS BRAZING RING



A threaded union has been added to the line of Braze-lok tube fittings. With a pre-positioned brazing ring inside the socket, the fitting provides a semi-permanent, brazed tubing joint to assure non-leak connections.

The new union is a disconnectable joint consisting of the SAE hydraulic 37° flare cone and a swivel nut to mate with the straight threaded cone. This provides a metal-to-metal seating.

Parker Fittings & Hose Div., Parker-Hannifin Corp., 17325 Euclid Ave., Cleveland 12, Ohio.

Use postpaid card. Circle No. 73

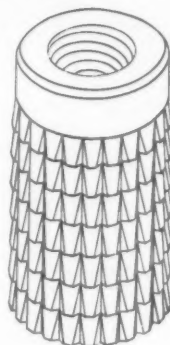
KNURLED AND SERRATED INSERTS FOR PLASTICS

Knurled and serrated inserts are designed for plastics, synthetics, rubber, wood, ceramics and similar materials. SPI inserts can be pressed into cold or hot materials or used in molding.

The insert hooks into cold materials. In hot or molding applications, the material being worked shrinks or flows into the many cavities on the outside of the insert and is anchored.

J. B. Plevyak Mfg. Co., 19 Jefferson St., Newton, N.J.

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DELRIN PIPE PLUGS DESIGN ADDS TO SEALING ABILITY



A lightweight pipe plug which seals tightly without sealing compound and won't loosen under severe vibration is made of Delrin.

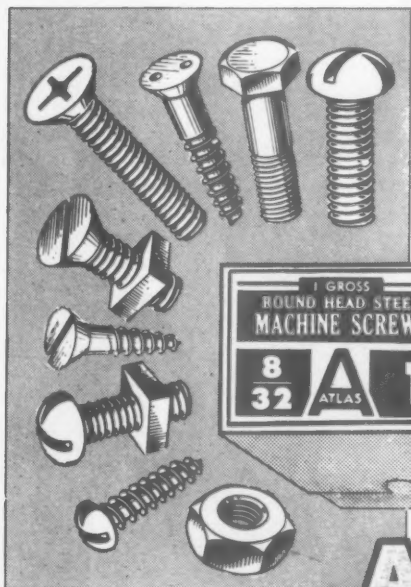
The plugs are usable with all types of organic fluids. Primary applications are in such products as compressors, pumps, gas and water meters, carburetors and fuel pumps, power steering units, outboard motors, appliances, air conditioners, hydraulic and pneumatic cylinders and vibration devices.

The plugs are available in $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ inch sizes in square heads, and $\frac{1}{8}$ inch sizes in hex heads.

Hollow design inside the plug increases sealing ability because as pressure increases the plug threads are forced tighter against the mating threads of the hole. In pressure tests, the plugs have withstood from 3000 to 10,000 psi. When used in tapped holes as in die castings, cross threading will not damage threads of the plug or the part. Loosening torque exceeds tightening torque.

Russell, Burdall & Ward Bolt and Nut Co., Dept. D, 100 Midland Ave., Port Chester, N.Y.

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NUTS BOLTS SCREWS WASHERS

Easy on the eye

attractive package facilitates both stocking and handling.

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ATLAS SCREW & SPECIALTY CO.

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Answer to problem on page 60.

Notice that the given number is equivalent to seven raised to ten thousand divided by seven and that ten thousand is equal to four times twenty-five hundred; then introducing a suitable variable, k , one ends with a two term number. The first term is equal to $10^5 (k-1)$ divided by seven and the second term, 143, is the solution to the problem.

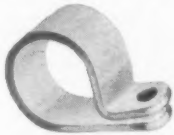
POLYPROPYLENE LOOP TYPE PLASTIC CLAMPS

Loop type polypropylene clamps are molded in seven sizes from $\frac{1}{8}$ " to $\frac{1}{2}$ " diameters.

Applicable as wire and cable clamps, transformer lead clips, strain reliefs, tube and pipe hangers, etc., the Hi Clamps open to any diameter and are held in place by a threaded fastener or rivet. All edges are rounded for protection against vibration, strain and pulling. Samples.

Holub Industries, Inc., Sycamore, Ill.

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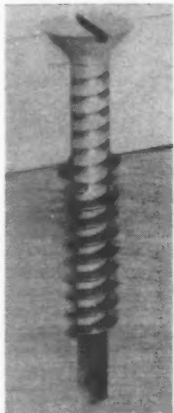
WOOD FASTENING SYSTEM USES WIRE THREAD INSERT

A new self-tapping wire screw thread insert is designed to give lifetime strength and re-usability to screw thread joints in products fabricated of wood, particle board and related fibrous materials.

Tests indicate that the No. 14 x $\frac{1}{2}$ assembly in holding power tests has a pull-out load nearly $2\frac{3}{4}$ times that of a No. 14 wood screw on hard maple; two times that of No. 14 sheet metal screws on three types of particle board; and twice that of a No. 14 wood screw on soft pine. Increased strength is obtained in both face and end grain construction.

Heli-Coil Corp., Shelter Rock Lane, Danbury, Conn.

Use postpaid card. Circle No. 77



O-RING COMPOUND OF 90 DUROMETER HARDNESS

A new Viton O-ring compound meets specification AMS 7279. V498-9 is a high temperature, fluid-resistant, fluorocarbon type compound of 90 durometer hardness. Tests indicate that the product performs with excellent results where application is for use in contact with air, fuels, lubricants and hydraulic fluids at temperatures up to 500°F.

Parker Seal Co., 10567 Jefferson Blvd., Culver City, Calif.

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Less cost!

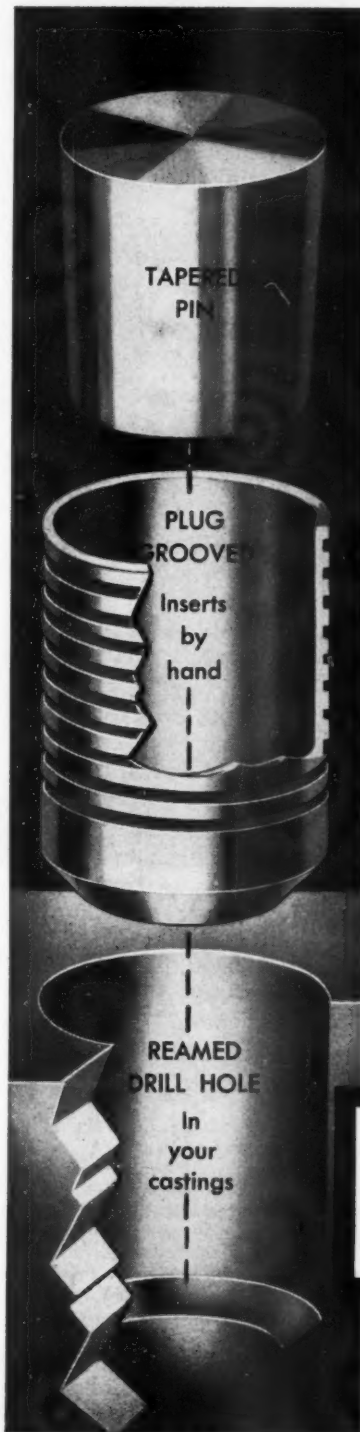
NEW PIN-PLUGS®

**Seal simply, positively
Prevent costly leaks!**

Now — forget conventional, costly methods of sealing holes that serve as flow or pressure passages. The Lee "Pin Plug" is a cylindrical plug with a tapered reamed hole partway through its center and numerous small grooves on its outside surface. Simply place it into reamed hole and drive in the tapered pin until ends are flush. Controlled expansion causes grooves in plug to "bite" into casting and form independent seals and retaining rings. Extensive laboratory tests report no leaks under normal pressures, often show bone dry seals up to pressures of 40,000 psi.

Now successfully and widely used on aircraft and missiles — for pumps, servo valves, regulators, etc. Available steel and aluminum and in both long and short series.

Pat #2,821,323



←.53 dia.→



→.09 dia.

(actual size)

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Whatever kind of fasteners you need, whether simple, standard types or complicated specials, you'll do better at Anti-Corrosive. We manufacture and can quote competitively in a range from 1/32" round to 4 1/2" hexagon, made to precision requirements.

For almost 35 years we have specialized in the manufacture of fasteners of the various stainless steels and have pioneered in the production of Nylon fasteners. Our raw material stock includes 30 different analyses

of stainless, while 10 different formulations of Nylon, Delrin, Teflon, P.V.C., Lexan are carried.

Send us your drawings and specifications for quotations or engineering counsel. Our 33 years of engineering experience with problems of corrosion due to thermal, electrical or chemical action can be helpful to you. Or send for literature or specific information about Anti-Corrosive facilities, policies, inventory of standard items or specially fabricated fastenings.

ANTI-CORROSIVE METAL PRODUCTS CO., INC.

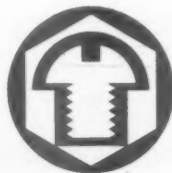
Office & Factory: Castleton-on-Hudson 10, New York

Mailing Address: P. O. Box 1894D, Albany 1, New York

Telephone: PERshing 2-7711—JUdson 2-7370 (direct line from New York City) Teletype: Castleton 353

West Coast Warehouse: 2922 East Olympic Blvd., Los Angeles 23, Calif.

Telephone: ANGelus 8-5131—Teletype: Los Angeles 212



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Assembly and Fastener Engineering

USEFUL LITERATURE

To receive your copy of any literature reviewed here, use the postpaid card opposite page 82.

167 FASTENER STANDARDS

Rapid identification of 167 standard aerospace fasteners—by configuration, specification number and generic name—is provided in a 10-page reference listing. A revision of an earlier edition, the new publication reviews more than twice as many aircraft and missile standards as did its predecessor. Fasteners are indexed numerically by part number in three separate groupings—for NAS, AN and MS parts respectively. Each part is identified visually by silhouette renderings of the basic configuration. Standard Pressed Steel Co., Box 1121, Jenkintown, Pa.

Use postpaid card. Circle No. 80

AIR TOOL SLIDE COMPUTER

A slide-computer and accompanying guidebook explain in detail the Planned Annual Retooling program to cut payroll dollars. The 30-page booklet covers each type of portable air tool in the line with computations on how output can be increased. Ingersoll-Rand Co., 11 Broadway, New York 4, N.Y.

Use postpaid card. Circle No. 81

ELECTRONIC WELDING

Welding that does not discolor or deform—millisecond electrolytic capacitor-discharge welding—is discussed in a 24-page catalog. A comparison of AC welding and stored-energy is made. Specifications and photos are offered on a line of welding heads and handpieces, power supplies and accessories. Weldmatic Div., Unitek Corp., 950 Royal Oaks Dr., Monrovia, Calif.

Use postpaid card. Circle No. 82

SOLDERLESS TERMINATION

"Creative Analysis" is a 10-page booklet outlining service (offered at no cost) to help manufacturers using elec-

trical/electronic circuits improve wiring. Solderless termination techniques are pictured in typical case histories. AMP Incorporated, Eisenhower Blvd., Harrisburg, Pa.

Use postpaid card. Circle No. 83

DRILLING-TAPPING SCREWS

Tapits—sheet metal screws that drill and tap their own holes—are introduced in four-page Brochure 688. Stripping torque test results accompany installation photos and tooling information. Parker-Kalon Div., Clifton, N.J.

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HARNESS WRAPPING

Advantages of spiral wrapping flexible electrical harnesses with polyethylene or nylon are discussed in a two-page data sheet. Physical properties of the three types of standard materials are charted and installations with a cable-former lacing tool illustrated. Panduit Corp., 14461 Waverly Ave., Midlothian, Ill.

Use postpaid card. Circle No. 85

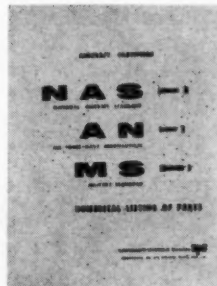
THREAD CUTTING OIL CHART

Cutting oils recommended by 23 oil companies are charted in the house organ "Die Headlines". Each company indicates by brand-name which product in his line would be the right grade to use in the threading of each of 40 different metals and materials. The Eastern Machine Screw Corp., 140 Truman St., New Haven, Conn.

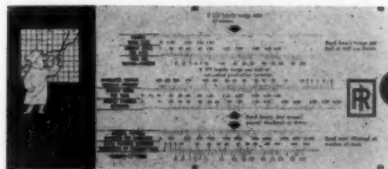
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NEW FASTENER STEEL

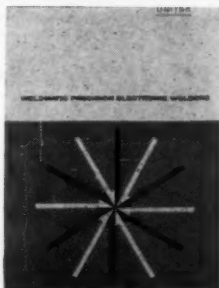
Two-page Bulletin 22 introduces e.t.d. (elevated temperature drawing) 150, an alloy steel which eliminates the need for heat treating and other secondary operations on parts. Guaranteed strengths and other specifications are



(See 80)



(See 81)



(See 82)

listed and six specific advantages are described. LaSalle Steel Co., Box 6900-A, Chicago 80, Ill.

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JOB DESIGNED FASTENERS

Assistance in designing cold headed fasteners for specific applications is offered in a four-page bulletin. Pictured threaded parts, nails, rivets illustrate type of work done. Double heading and other secondary operations are available. John Hassall, Inc., Box 2246, Westbury, L.I., N.Y.

Use postpaid card. Circle No. 88



AUTO HAND TOOLS

A complete line of hand tools for installing and servicing automobile components is specified in Catalog 27. Special-purpose pliers, clamps, compressors, wrenches and drivers are pictured in use and sizes given. K-D Mfg. Co., 526 N. Plum, Lancaster, Pa.

Use postpaid card. Circle No. 89

RIVET POCKET TABLES

A plastic pocket guide gives reference data on Cherry rivets: drill sizes, hole size limits, material thickness chart. The 3"x5" guide explains the blind rivet numbering system and pictures four available series. Cherry Rivet Div., Townsend Co., Box 2157-Z, Santa Ana, California.

Use postpaid card. Circle No. 90

WELDING ALLOY WIRES

Electrical connections can be made on resistance alloy wires from .025" to .0007" diameters at production line speeds. Model W-2 electronic tapwelder is pictured, described and priced in a two-page flyer. The HanJohn Co., Inc., 2711 E. Foothill Blvd., Pasadena, Calif.

Use postpaid card. Circle No. 91

CLAMPS, SPRINGS

Clamps, formed from Neg'ator springs, have a widely adjustable opening and are pictured, specified and priced in a two-page data sheet. Sizes and approx. clamping force are included. Hunter Spring Co., 1 Spring Ave., Lansdale, Pa.

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MINIATURE SCREWDRIVER

Portable air screwdrivers are miniaturized for precision assembly work. The British-made Desoutter line is spe-

cified and priced in a two-page flyer. The smallest size is 5-7/16" long and weighs 8 oz. Newage Industries Inc., 222 York Rd., Jenkintown 1, Pa.

Use postpaid card. Circle No. 93

SELF-FLUXING SOLDER

Characteristics, applications and procedures in using the No. 55 self-fluxing soldering alloy are presented in a one-page data sheet. Strengths are listed for the low melting aluminum solder, which is rubbed onto the work. All-State Welding Alloys Co., Inc., 249 Ferris Ave., White Plains, N.Y.

Use postpaid card. Circle No. 94

CLIP-TYPE RIVET

A fastener designed for quick assembly of sheet metal parts and moldings is introduced in a 12-page catalog. Riv-its are clinched with pliers or an air gun. Installation sequence drawings and dimensions for sizes available are given. Robin Products, 27027 Groesbeck Hwy., Warren, Mich.

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STYLE AND SIZES FOR ALL MACHINES ON WHICH THREADS ARE CUT

This die head is unique

THERE IS NO OTHER LIKE IT

It cuts threads with insert chasers. These are, in reality, small sections of the business end of large and expensive chasers, but with this important difference: *their cost is so low they can be even thrown away when dull.* For example, for approximately \$50 you can get a dozen sets of insert chasers, each set ground ready to go. Change now to insert chaser die heads and watch your performance improve. "UNIFIED AND AMERICAN SCREW THREAD DIGEST."

THE EASTERN MACHINE SCREW CORPORATION, 25-48 Barclay St., New Haven, Conn.

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CAN IT BE WELDED?

Several hundred typical components which have been resistance welded are categorized by type of welding, pictured and identified by metal type and thickness. Twenty-four page Laboratory Bulletin SP-18 offers case histories in spot, projection, seam, flash-butt welding. Taylor-Winfield Corp., Warren, Ohio.

Use postpaid card. Circle No. 96

POWER ASSEMBLY TOOLS

Eighty-one power tools, including a line of nut setters and screwdrivers, are dealt with in a two-fold mailer catalog. Anti-ratcheting, adjustable and positive clutch type models are available. Photos and condensed specs. Skil Corp., 5033 Elston Ave., Chicago 30, Ill.

Use postpaid card. Circle No. 97

BENCH WELDING HEAD

Air and foot operated bench welding heads are the subject of two-page data sheet No. 660. Designed for spotwelding small electronic assemblies, the units are pictured and specified. Ewald Instruments, Rt. 7, Kent, Conn.

Use postpaid card. Circle No. 98

O-RING SEAL FITTINGS

A 118-page catalog deals with tube fittings which feature O-ring seals. Each spec table is coupled with a large cutaway drawing with all dimensions

SPS
STANDARD PRESSED STEEL CO. • JENKINTOWN, PENNSYLVANIA

Ted:
Configuration and thread form
check out fine. Let's double-
check head to shank fillet.

Jim

On special fasteners, SPS gives you more than just a quotation

When SPS quotes on your special threaded fastener, you get more than just an accurate estimate of cost. You also get design confirmation. Our engineering and methods people not only interpret your prints and specs; they also analyze them—carefully. And if they have any questions (socket depth, fillet radius, etc.), they double-check with you.

Certainly nobody knows all the answers on threaded fasteners. But we can say this: No one in the industry has invested more in fastener research and development than SPS . . . with commensurate results. Because of this experience, we believe we can offer a constructive or economical design suggestion where specials are concerned.

Production facilities? SPS can meet any requirement you may have in a socket-type fastener. Special con-

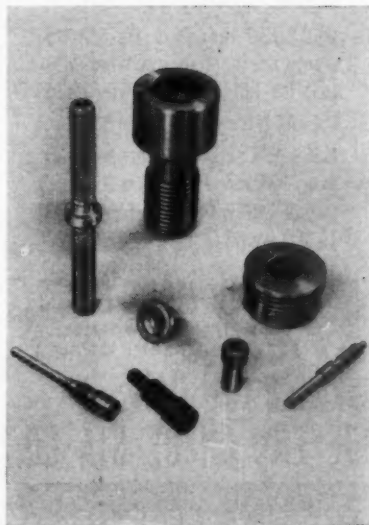
figuration, special material, special threads, special plating or surface treatment, special tolerances . . . we are equipped to handle them all, utilizing the most advanced manufacturing and quality-control techniques.

Whatever your needs in threaded fasteners, it will pay you to check with SPS. Whether you want design confirmation or complete engineering consultation service from the outset, we make it our business to see that you get a sound, reliable part. Contact your local SPS distributor or write Standard Pressed Steel Co., SPECIAL INDUSTRIAL FASTENER Division, SPS, JENKINTOWN 78, PA.

SPS

where reliability replaces probability

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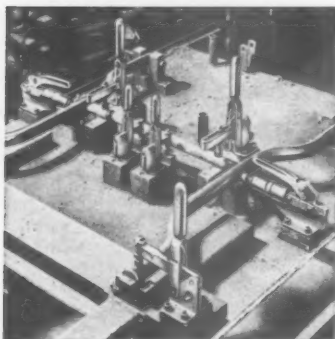
From extreme specials to near-standards, SPS can meet almost any conceivable requirement you may have in configuration, material, thread form, finish or tolerances.



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TOGGLE CLAMP SECURITY



BECAUSE when you have the work held by De-Sta-Co clamps you know it will stay put until the job is done.

BECAUSE there's a De-Sta-Co clamp immediately available with just the holding power you need for any job—large or small.

BECAUSE you can choose from over 140 models that will push, pull or lock with forces from 50 to 10,000 pounds.

FOR MORE FACTS
WRITE FOR INFORMATIVE
TOGGLE CLAMP CATALOG
**YOU CAN
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DETROIT STAMPING COMPANY



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letter keyed to specs and dimensions on the table. The indexed catalog includes a complete line of fittings and accessories. The Lenz Co., 3301 Klepinger Rd., Dayton 1, Ohio.

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STRUCTURAL BOLT

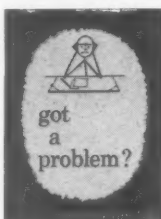
How larger heads and shorter threads on a high-strength structural bolt save up to 40% in bearing-type connections is told in a four-page technical bulletin. Excerpts from the latest ASTM spec for A325 bolts describe installation, shear, joints, etc. Illustrated. Russell, Burdall & Ward Bolt and Nut Co., 100 Midland Ave., Port Chester, N.Y.

Use postpaid card. Circle No. 100

PROBLEM-SOLVING PROCESS

"Got a Problem?" is a 20-page cartoon-illustrated booklet describing a production problem solving and design service. Capacities for handling hard-to-do jobs in forging, welding, designing automatic and manual assembly devices and other metal-working operations are discussed by fields. Valve Div., Eaton Mfg. Co., Ave. C, Battle Creek, Mich.

Use postpaid card. Circle No. 101



1960 SERIES CAP SCREWS

Complete dimensional data on both the 1960 and 1936 series of socket head cap screws are detailed in a colorful 10-page brochure. The differences in the series are clearly pointed out. Thread length charts are provided, with all sheets three-ring punched. Standard Screw Co., 2701 Washington Blvd., Bellwood, Ill.

Use postpaid card. Circle No. 102

QUICK RELEASE PIN

How adjustable wall thickness bushings improve upon quick release pin design is discussed through text and drawings in a two-page data sheet. Pins resist high tension loads, provide tight radial fits and yet can be easily released. Adjustable Bushing Co., 12036 Vose St., North Hollywood, Calif.

Use postpaid card. Circle No. 103

RIVETS, BOLT TOOLS

Tooling for installing high temperature stainless rivets and miniature bolts is specified in 34-page tool catalog 2-601. How the pin and collar type fastener works and how it is installed is pictured and described. Various gun sets, adaptors, insert sets, bucking bars, etc. are cataloged. Hi-Shear Rivet Tool Co., 2600 W. 247th St., Torrance, Calif.

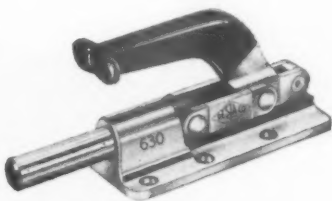
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TOGGLE CLAMPS



LIKE THE NEW MODEL 630

Designed for jobs requiring fast holding action, the new 630 is a medium duty, plunger type that locks in either push or pull position—has holding pressure of 1600 pounds. Flared end, heavy Vinyl-covered safety handle. Solid one piece forged base—large diameter bearings—heavy steel linkage—plunger copper plated with Irrelac finish.

OVER 140 OTHER MODELS

Choose from 13 standard styles, over 140 models—holding power from 50 to 12,000 pounds—Templates available on request.

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Assembly and Fastener Engineering

TERMINALS

"Terminology," a four-page house organ, features a section for designers on tolerance factors in chassis preparation for press-fit terminals. Other subjects include teflon bushings; a new method of programming without cards on the Sealectroboard and new products. Sealectro Corp., 139 Hoyt St., Mamaroneck, N.Y.

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AIR ASSEMBLY PRESSES

A new line of single acting air presses for punching, swaging, staking, assembly and other operations is introduced in four-page Bulletin 85. Twenty-eight models built around four basic press sizes ranging from 1/2 to 2 ton capacities are pictured and specified. Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N.Y.

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LOCKNUTS

A prevailing torque type locknut stays locked with a friction grip anywhere on the bolt. Action of the Stollock nut is described and specifications of full and jam nuts listed in a four-page punched ring bulletin. Thread-All Sales Co., 1045 Perry St., Detroit 1, Michigan.

Use postpaid card. Circle No. 107

BACK-UP RINGS

Increasing O-ring life and sealing properties with the use of a contoured and continuous back-up ring is the topic of design Catalog 5482. Sizes, dimensions, compound information is given through copy and application drawings. Parker Seal Co., 10567 Jefferson Blvd., Culver City, Calif.

Use postpaid card. Circle No. 108

CAP SCREW TORQUE

A comprehensive chart includes recommended max. tightening torque of each size in a socket head cap screw line. The two-page data sheet introduces the new IB (improved bearing) screw with specs, yield strength, thread series in chart form. Standard sizes are in color. Mac-It Parts Co., 275 E. Liberty St., Lancaster, Pa.

Use postpaid card. Circle No. 109

WORK-HOLDING FIXTURES

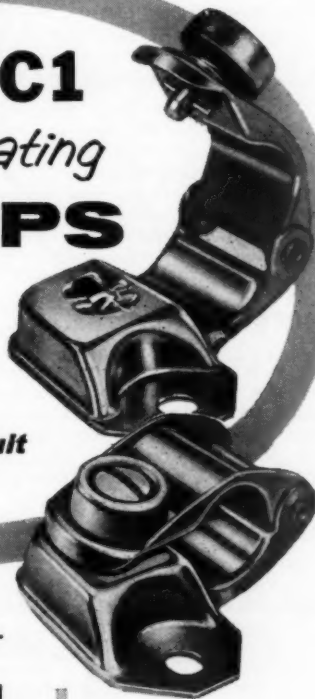
Work-holding fixtures for electronic assembly are introduced in eight-page Catalog HF-560. Visers, card holders, harness board holders, positioners and a complete production assembly system are pictured and specified. Flx-Arm positioners hold up to 200 in./lbs. and



*Designed To
Save You Time!*

Camloc 7C1 Quick-Operating CLAMPS

**Speeds Up
Installation and
Maintenance
of wire bundles,
hose, cable, conduit**



- Clamp permanently mounts to structure with one rivet or bolt.
- Material to be held is easily added or removed after clamp is mounted.
- Uses accepted, proven, vibration-proof Camloc 1/4-turn fasteners.
- Wide clamping area and rounded edges prevent scarring or cutting.
- Controlled stud length of 1/4-turn fastener prevents crushing of clamped material.
- Insulated cushions supplied if needed.
- Two-hole mounting and variations in shape available on special order.
- Sizes from 1/4" to 1 1/2" diameters.

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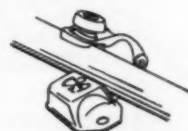


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CLOSE HINGED
RETAINER



LOCK TIGHT WITH
A 1/4 TURN

have 360° rotation features. Flotron Industries, 1608 Centinela Ave., Inglewood 3, Calif.

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WELDER FOR ELECTRONICS

Design and function of a new two-column projection welder for transistors and similar electronic devices is featured in two-page data sheet No. 19. Components are arrow-identified on a photo and the unit is shown in use with a controlled atmosphere cabinet. Thomson Electric Welder Co., Lynn, Massachusetts.

Use postpaid card. Circle No. 111

ELECTRICAL CONNECTORS

Single conductor plugs and receptacles from 25 to 250 amp. are introduced in a two-page bulletin. The nylon electrical connectors are pictured dimensionally and in actual available colors. The quick assembly feature is demonstrated. The Superior Electric Co., 97 Lee Ave., Bristol, Conn.

Use postpaid card. Circle No. 112

SCREW SLOTTER

Capacity range of the Model C screw slotter is uniquely pictured through diagrams and specifications in a four-page bulletin. Close-up photos and text detail each feature of the machine. Roy Machinery & Sales, Inc., New Britain Ave., Farmington, Conn.

Use postpaid card. Circle No. 113

PACKAGING FASTENERS

Model 50A Packmaster, which packages hard or soft products in foil, film or paper, is shown in operation in six-page Form 50A-1. Production rates are up to 150 parts per minute. Illustrated Sundstrand-American Broach, Ann Arbor, Mich.

Use postpaid card. Circle No. 114



ROTARY INDEXING CHASSIS

Basic components for automatic assembly machines are cataloged in an eight-page bulletin. Heavy duty and standard rotary indexing chassis (both single and double turret) are pictured and specified. Transmissions and accessories are also offered. Sylvania Lighting Products, 121 Loring Ave., Salem, Mass.

Use postpaid card. Circle No. 115

TOOLING COMPONENTS

Stainless steel tooling components are specified and priced in a 32-page

catalog. Studs, washers, clamps, knobs, assemblies are alphabetically indexed. Large dimensional drawings. Carr Lane Mfg. Co., 4200 Krause Ct., St. Louis 19, Missouri.

Use postpaid card. Circle No. 116

STUD WELDING POWER UNIT

A silicon rectifier power unit designed for Nelson stud welding is described in four page Bulletin 7587. Photos and specifications of the Surge Arc are accompanied by explanatory text. Welding Div., Westinghouse Electric Corp., Box 2025, Buffalo 5, N.Y.

Use postpaid card. Circle No. 117

LOCKING DEVICES

Thirty-six locking devices and allied hardware items for containers, cabinets and special applications are dimensionally drawn and described in four-page Bulletin 7. Lock construction is in pin and disc tumbler designs. Corbin Cabinet Lock Div., The American Hardware Corp., 10 Franklin Sq., New Britain, Conn.

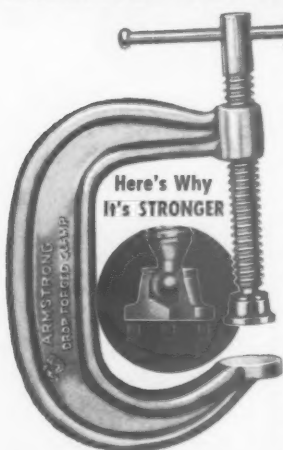
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PRESS-IN NUT

For load bearing threads in thick or thin ductile sheet metal, the new P37 nut can be installed by punch press, vise or hammer. A two-page data sheet lists specs and load strength, test results and features. Hi-Shear Corp., 2600 W. 247th St., Torrance, Calif.

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New ARMSTRONG Swivel Pad can't come off



Call your ARMSTRONG Distributor

Your ARMSTRONG Distributor can offer delivery from stock on this "400-Series" deep throat, drop-forged "C" Clamp with the new Ball-joint Swivel Pad. He also carries in stock the other styles of clamps in the ARMSTRONG Line—the broadest line of drop forged "C" Clamps.

ARMSTRONG BROS. TOOL CO., 5203 W. ARMSTRONG AVE. CHICAGO 48, ILLINOIS

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Now ARMSTRONG deep throat "C" Clamps have the new (Pat. apd. for) ARMSTRONG Ball-joint Swivel Pad. This "C" Clamp pad, developed by ARMSTRONG Engineers, is tougher than any on the market. Rigorous testing in our own plant first proved this fact, and field tests in factories throughout the country have confirmed our own test results.

The lip of the opening in the ARMSTRONG Ball-joint Swivel Pad is undercut so that when the ball of the screw is inserted, and the lip is permanently forced down, a solid steel wall is formed, inside the pad cavity, completely encircling the ball.

This wall of steel makes it impossible for the pad to come off the screw during normal use. In fact, our tests have proved that it is virtually impossible to intentionally knock the pad off with a hammer—yet the pad is free to swivel through an arc of approximately 40°.

Nothing SEALS as POSITIVE!



ROLLED NYLON WASHERS

make a positive seal up to 250°F and can be used with any standard fastener including tapping screws

NYLTITE WASHERS SEAL AND STOP LEAKS WITHSTAND PRESSURE UP TO 15,000 PSI RESIST VIBRATION • PREVENT CRAZING RETARD ELECTROLYSIS AND ARE EXCELLENT FOR INSULATING

(Long, headed sleeves are also available from stock)

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Assembly and Fastener Engineering

RIVETING IDEAS

Ways for using closed-end blind rivets are suggested in Vol. 1, No. 1 of "Riveting and Assembly Ideas." Illustrated case histories, selecting the proper power tool, and how the fastener works are chapters of the eight-page house organ. Pop Rivet Div., United Shoe Machinery Corp., Shelton, Conn.

Use postpaid card. Circle No. 120

MAGNIFYING COMPARATOR

Details about a magnifying comparator which permits reading a steel scale to .001" is contained in a pocket-sized bulletin. The product is also used for measuring miniature parts and assemblies. Twenty available reticles are pictured and described. Finescale Co., 218 S. Western Ave., Los Angeles 4, California.

Use postpaid card. Circle No. 121

QUARTER-TURN FASTENERS

Four types of spiral cam, quarter-turn fasteners are separately indexed and specified in 54-page Catalog D-3. Where and how to use and install the quick-release fasteners is told through text, exploded and dimensional drawings and tables. Dzus Fastener Co., Inc., 125 Union St., West Islip, N.Y.

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MINIATURE INDEX TABLE

Miniature turret indexing units are specified in a two-page technical flyer. The Series J features a crossover type indexing cam with a cyclidial displacement path. Dimensional drawings introduce the foot and flange type models. Swanson-Erie Corp., 814 E. 8th St., Erie, Pennsylvania.

Use postpaid card. Circle No. 123

HEAT TREATING FURNACES

Operation of an electrically-heated and fuel fired continuous chain belt conveyor furnace is described and illustrated in 12-page Bulletin 601. The units are used for clean and scale-free hardening, carbon restoration, carburizing and other treatment of fasteners and small and medium size parts. The Electric Furnace Co., 600 W. Wilson St., Salem, Ohio.

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TESTING FOR CRACKS

Magnaflux and Magnaglo detect all cracks open to the surface in steel or iron castings, forgings, weldments, shafts, etc. Four portable kits make on-the-line fluorescent and magnetic non-destructive testing practical. De-

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With competitive pressures of a buyers' market squeezing every extra cent out of production costs, anything that increases assembly or fastening times automatically affects profits. That's why you can't risk playing "shell games" with fastener suppliers. You have to be sure that you're getting the best on all counts.

As the leading producer of precision turned brass and aluminum nuts, Fischer combines in-plant tolerances that exceed industry standards, electronic order processing systems and unique custom machinery to assure you of premium quality . . . on-schedule delivery . . . competitive pricing on each job.

Whatever your precision nut requirements . . . standards, specials or miniatures . . . there's no gamble when you specify: FISCHER.



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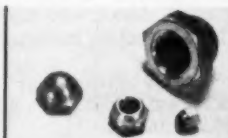
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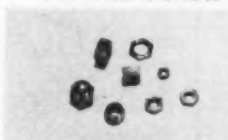
MACHINE SCREW



CAP



PANEL/SWITCH



MINIATURE



SPECIAL



SEMI-FINISHED

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tails are told in four-page Form 1681. Magnaflux Corp., 7301 W. Ainslie Ave., Chicago 31, Ill.

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JOINING ALUMINUM

How to weld, braze and solder aluminum is told through charts, texts and photos in a 40-page pocket-sized manual. Each joining method is dealt with separately, covering joint design, alloy selection, application. All-State Welding Alloys Co., Inc., 249 Ferris Ave., White Plains, N.Y.

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T-SLOT BOLTS

Alloys steel T-slot bolts for holding down work for machining operations are described in a two-page data sheet. A cross-sectional photo of the forged fastener points out strength features. Prices are listed for bolts, nuts and washers. Boyar-Schultz Corp., 2000 S. 25th Ave., Broadview, Ill.

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BALLIZING

"New Dimensions in Ballizing" describes this process of sizing and finishing a hole by pressing a precision ball through the hole. The 16-page Bulletin B-46 shows hand and automatic setups, case history data and cost advantages. Industrial Tectonics, Inc., 3686 Jackson Rd., Ann Arbor, Mich.

Use postpaid card. Circle No. 128

LIVE ROLLER CONVEYOR

Principles of adjustable pressure conveyor operation and their application to live roller conveyors are explained in copy and photo-diagrams. Four-page Bulletin 1250 covers the types of materials, cartons and containers the APC conveyor is suited for. Typical applications are shown. The Rapids-Standard Co., Inc., 342 Rapistan Bldg., Grand Rapids, Mich.

Use postpaid card. Circle No. 129



HAND ASSEMBLY TOOLS

Wrenches, pliers, cutters, screwdrivers, sockets and other hand assembly tools and accessories are presented in 16-page Catalog H-9. Illustrated. Owatonna Tool Co., 114 Cedar St., Owatonna, Minn.

Use postpaid card. Circle No. 130

HYDROGEN EMBRITTLEMENT

Specific recommendations for the elimination of hydrogen embrittlement are contained in an eight-page tech-

nical report. The photo-and-chart illustrated booklet details materials control and processing precautions that hold hydrogen pick-up within harmless limits in electroplated fasteners. Standard Pressed Steel Co., Box 1121, Jenkintown, Pa.

Use postpaid card. Circle No. 131

HIGH-TEMPERATURE TAPES

Properties of 10 high-temperature Teflon, Fiberglas and silicone rubber tapes are presented in chart-form in a six-page brochure. Other design features of the pressure sensitive tapes are described. The Connecticut Hard Rubber Co., 407 East St., New Haven 9, Connecticut.

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MACHINE STOP

Features of an instant-action machine stop are pictured and described in a two-page flyer. The portable unit is adjustable to stop machines when any of five conditions are not met. Rands Products, Inc., Willimantic, Conn.

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NYLON TAPE FASTENER

Case studies show how new display techniques are made possible by Velcro, the nylon tape fastener utilizing thousands of tiny hooks and eyes. Velcro Corp., 681 Fifth Ave., New York 22, N.Y.

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SEND FOR YOUR FREE COPY!

TA's new Manual 210G gives you 94 pages of prints, tables, illustrations, specs and installation tips.

Save money for your company. Conserve your valuable time. Don't design clamps when TA offers you 40,000 of them to choose from at off-the-shelf prices!

This free manual shows all sizes and styles of loop clamps, bonding clamps, multiple clamps, center clamps, wire harness clamps, wave-guide clamps—plus blocks, brackets, busbars, line supports, and related items.

Sizes from 1/4" to 6" diameter in 16ths for bolt mountings from #4 to 3/4". Available in aluminum, steel, and stainless. All manner of high and low temperature insulation materials.



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COTTER PINS

CARBON STEEL
STAINLESS STEEL
BRASS
EVERDUR
BRONZE
MONEL

Send for your catalog

STANDARD LOCK WASHER & MFG. CO., INC.
17 VIKING TERRACE • WORCESTER, MASS.

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Assembly and Fastener Engineering

DESIGNING WITH U-RINGS

A designers reference guide to the Palmetto U-ring low friction seal gives applications, composition, specifications. Four-page Form UR-360 is complete with tables, text and illustrations. Green, Tweed & Co., North Wales, Pa.

Use postpaid card. Circle No. 135

SELF-STUDY BRAZING COURSE

In-plant or at-home training in silver brazing is subject of 8-page bulletin which should be of special interest to engineers charged with training production personnel. Training Division, Handy & Harman, 82 Fulton St., New York 38, N.Y.

Use postpaid card. Circle No. 136

SCREW WALL CHART

A cardboard 8 1/4 x 11 chart pictures the actual sizes of machine and tapping screws. Lengths ranging from 1/8" to 6" and diameters 2 through 3/8 are photographed. Head types and finishes are also indicated. Fasteners are available in packages. Charts may be secured from distributors only. Southern Screw Co., Box 1360, Statesville, North Carolina.

ASA BOLT, NUT STANDARD

American Standard Square and Hexagon Bolt and Nuts, B18.2-1960 has been issued. Changes deal mainly with length tolerances. It is a revision of the 1955 standard. \$2. American Standards Association, 10 E. 40th St., N.Y. 16.

REPRINTS AVAILABLE

- "Design and Application of Weld Fasteners" — July and August, 1959
- "Torque Considerations in Design" — January, 1960
- "Which Thread — Coarse or Fine?" — February, 1960
- "Designing for Silver Brazing with Preforms" — April, 1960
- "Resistance Welding Stainless Steel" — June, 1960
- "The Strength of Screw Threads" — June, 1960

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LONG, THIN PINS, RIVETS

COLD HEADED

FAST ACCURATELY

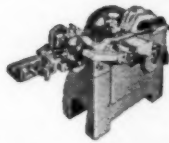


Morris-Omega Special Model "O"

Open Die Double Stroke Header, produces long thin parts in diameters from .020" to .090" up to 2 3/8" long at rates up to 100 per minute!

Also available: Solid Die Headers for wire diameters as small as .012".

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AIR-TIGHT, WATER-TIGHT BLIND FASTENER

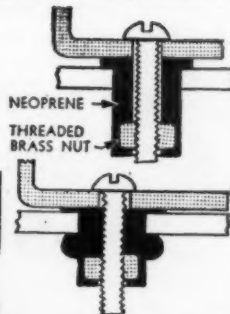


"WELL-NUTS" • isolate vibration • space and fasten simultaneously • accept conventional threaded fasteners • will not crack or mar porcelain or glass. Send for literature and samples.

*Patented

STANDARD SIZES

CATALOG NUMBER	6S	10S	G-1032	10SL	1/4S	D-1420
STANDARD THREAD	6-32	10-32	10-32	10-32	1/4-20	1/4-20
LENGTH	7/16"	33/64"	5/8"	1"	37/64"	41/64"



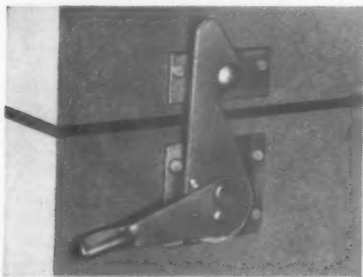
ROCKWELL PRODUCTS CORPORATION

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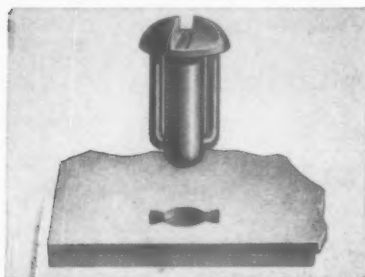
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ANSWERS to specific fastening problems ...by SIMMONS

Economy, design flexibility, quick and easy installation, strength, and smooth, dependable action are advantages of these Simmons Fasteners, made for a variety of special applications. Whatever your fastening problem, engineering aid is available from Simmons.



HOOK-LOCK—Springless, positive-locking latch which lies flat against mounting surface, open or closed. Provides high closing pressure and load-carrying capacity. For military as well as commercial container applications.

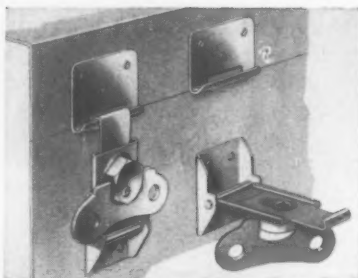


SPRING-LOCK—Perfect, proved blind rivet for removable covers and panels on electric and electronic equipment, sheet-metal automobile parts, appliances.

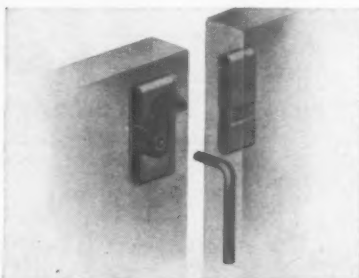
Plastic Spring-Lock Shelf Supports with "heart of steel" help refrigerator makers cut costs, speed production, simplify servicing.



SEND TODAY for your copy of the Simmons catalog, with specifications, applications, installation instructions for all Simmons Fasteners. Samples are available. For special assistance, describe your requirements.



LINK-LOCK—Ideal latching device where heavy locking pressure is necessary. Available in heavy, medium, light duty, for use in military and commercial containers and demountable construction.

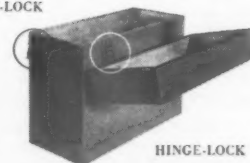


DUAL-LOCK—Impact and vibration-proof high-load butt-joint fastener that will not accidentally unlock or loosen. Recess in panels or surface mount. Withstands 7000-lb. tension.

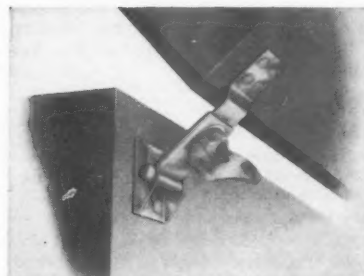


QUICK-LOCK—For assembling removable panels and access doors. Locked by a 90° turn. Various sizes and types, for weather-tight electrical units, cowlings, access panels.

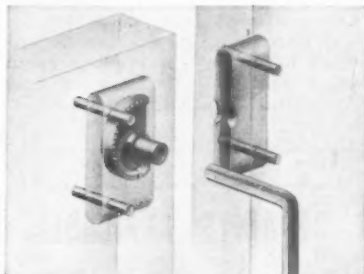
LINK-LOCK



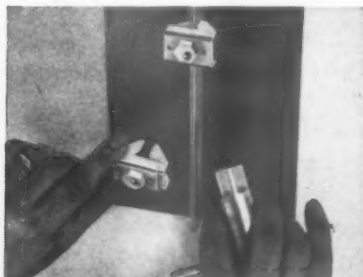
HINGE-LOCK



HINGE-LOCK—A rugged pressure hinge which provides a strong seal along the hinge line of gasketed equipment containers and transit cases. Matched hardware with LINK-LOCK.



ROTO-LOCK—Versatile fastener for butt or right-angle joints in portable shelters, partitions, knock-down shipping boxes, etc. Solidly built, springless.



CLAMP-LOCK—A simple and strong, positive-locking clamp for fast assembly (and disassembly) of permanent or temporary rooms and buildings of flanged-panel construction.

SIMMONS FASTENER CORPORATION

1796 North Broadway, Albany 1, New York

See our condensed catalog in Sweet's Product Design File

INDUSTRY MAKES NEWS



Three hot-coiled compression springs form a single unit used to stabilize ICBM on their launching pads.



Critical welding operations on heat exchangers is done in a portable clean-room at the Walden Plant of American-Standard.

FASTENER SHIPMENTS STEADY IN JULY

Shipments of industrial fasteners in July were 91% of the 1956-58 average, on a seasonally adjusted basis. The Industrial Fasteners Institute reported that "the traditionally extensive vacation shutdowns of this industry in July, require such large adjustments that a small change from the June seasonally adjusted figure of 94% has no significance."

PORTABLE CLEAN-ROOM FOR WELDING

A portable, expandable clean-room controls airborne contamination for critical welding operations on heat exchanger equipment at the Walden Plant of American-Standard Industrial Division in Buffalo, New York.

Confronted with the problem of welding various components on heat exchanger equipment tube bundles, which may measure 40 or more feet long in some cases, American-Standard engineers designed a portable clean-room that can be expanded to contain tube bundles of virtually any length.

Placed on the plant floor, the clean-room is constructed with hardboard side panels and a heavy-duty polyethylene semicircular top. The room is expandable in six-foot lengths to accommodate the necessary tube bundle length. A fan on the inlet vent draws air through a filter into one end of the room, and another fan at the opposite end forces air out to maintain a continuous flow of contaminant-controlled air.

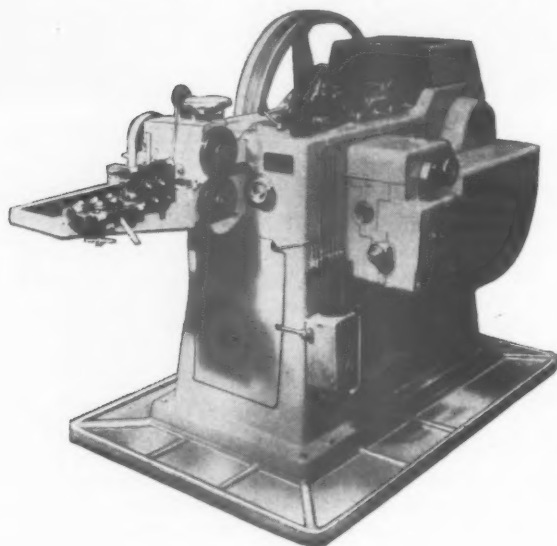
ICBM PADS USE WORLD'S BIGGEST SPRING

Two hot-coiled compression springs, plus a third smaller spring, form a single unit, several of which are used to stabilize ICBM missiles on their launching pads against the possible shocks of wartime enemy atomic explosions.

Designed and manufactured by the Union Spring Company, New Kensington, Pa., they are the largest springs ever made on a production basis. The big outer-coil is approximately 49" high, 22" outside diameter and is made of 3" 4160M spring steel bars. The three springs, concentrically nested, total over

continued

Single and Double Blow COLD HEADERS



These famous German machines feature:

- ★ CAPACITIES—3/16" to 1" dia. wire stock;
Short Stroke—1" to 4-15/16" shaft length;
Long Stroke—1-3/4" to 8"
- ★ Fitted with solid or open dies
- ★ QUICKLY ADJUSTABLE PUNCH SHIFTING
SLIDE—has double locking mechanism
- ★ WEAR PLATES ARE ADJUSTABLE nitraded
steel
- ★ AUTOMATIC LUBRICATING SYSTEM—to all
parts of machine
- ★ Special types of Cold Headers for the pro-
duction of balls, cylindrical and taper rollers
and cold forged components
- ★ A complete range of auxiliary equipment such
as re-heading machines, trimmers, pointers,
slotters and thread rollers are available

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1400 pounds. After coiling, heat treating and tempering, with a final hardness of 461 Brinnell, the coils are shot-peened by the Everlast process, which gives a fatigue-life increase of 500 to 1000% over unpeened springs. Each coil is wound in the opposite direction to the one it is set inside of, to prevent clashing or interference. The springs are coated with an aircraft-specification lacquer.

ENGINEER JOINS WATERBURY FARREL AS V-P



France Q. Wilson has been appointed vice president for marketing by the Waterbury Farrel Foundry & Machine Co., Division of Textron Inc., Waterbury, Conn.

Wilson has had substantial marketing experience with the Elliott Company of Jeannette, Pa., a division of Carrier Corporation, and more recently with Solar Aircraft Company of San Diego, Calif. He is a native of California and holds a degree in electrical engineering from the University of Kansas.

WESTINGHOUSE RENAMES WELDING DEPT.

The Westinghouse Electric Corporation has announced that its welding department will now be designated as the West-Ing-Arc Department. This is regarded as recognition of the fact that its products are engineered, manufactured, and marketed for use in the fields of metals joining, fusing, separation, metals removal, finishing, surfacing or depositing and melting, principled on the electric arc.

RB&W NAMES JONES TO EXPORT SALES POST

Ward K. Jones Jr., has been appointed export manager of sales for Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N.Y. Jones succeeds William P. Rave, who retired March 31 after 26 years with RB&W.

A native of Greenwich, Conn., Jones joined RB&W in 1946. He was engaged in domestic sales in metropolitan New York, in the export department and most recently as assistant office sales manager in Port Chester.



FABRIFORM ADDS BRAZING SPECIALISTS

A. M. Thompson, general manager of Fabriform Metal Brazing, Los Angeles, has announced the recent addition of Roy Omans as assistant general manager in charge of sales.

Omans joined Fabriform with a background of 11 years' experience with one of Los Angeles' largest brazing concerns. Also added to the sales staff is Cecil Milne, who has specialized in all types of metal joining problems.

PLUMMER ELECTED INT'L WELDING OFFICER



The Governing Council of the International Institute of Welding elected Fred L. Plummer international-vice president of the Institute and he assumed office at the Annual Assembly in Liege, Belgium.

Plummer is national secretary of the American Welding Society and chairman of the American Council which selects delegates and directs the American activities of I.I.W.

WILTON TOOL AGAIN EXPANDS PLANT

Wilton Tool Mfg. Co., Inc., is expanding its Schiller Park, Ill., plant for the second time since the plant was constructed five years ago. The new addition is being constructed at a cost of \$100,000 and will add 12,000 square feet for additional manufacturing facilities.

Assembly and Fastener Engineering

COLOR-CODED PRICING SAVES BUYING TIME



Pre-priced, color-coded bolts are being displayed in self-service merchandisers by the Screw and Bolt Corporation of America, Pittsburgh.

Fifty-three sizes of zinc plated bolts, with nuts attached, are separated into eight price groups and coded with different colors for at-a-glance pricing. Color is applied to the end of the machine, carriage and stove bolts, and to the side of the head on lag bolts.

In the event of a price change, the colors remain the same. The company will merely issue a new set of color price charts to the hardware dealers.

NEW FIELD ENGINEER FOR HUNTER SPRING

Hunter Spring Co., a division of American Machine & Metals, Inc., Lansdale, Pa., announces the appointment of Richard B. Vander Laan as field engineer serving a territory comprised of Illinois, Wisconsin, Indiana, and Minnesota.

TECH-SER, INC. TO REPRESENT WELDMATIC

Weldmatic Division of Unitek Corporation, Monrovia, Calif. has appointed Tech-Ser, Inc., to represent the division in California, Nevada, and Arizona. Tech-Ser will handle Weldmatic's entire line of precision stored-energy welding equipment for applications such as: electronic component packaging and vacuum tube assembly; welding thermocouple and fine wire junctions, and joining extremely thin foils and screens.

GOODRICH PROMOTES ADHESIVES ENGINEER

Anthony Latona, senior product engineer in the adhesives division of B. F. Goodrich Industrial Products Company, has been appointed manager of the division's latex and plastisol compounding and development laboratory.

He joined B. F. Goodrich as a materials engineer in 1952 and has held engineering posts in the company's reclaiming plants.

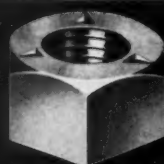


ALL-STATE OFFERS TECHNICAL PROGRAMS

All-State Welding Alloys Company, Inc. of White Plains, New York, offers complete welding, brazing and soldering instructions programs and live demonstrations designed to fit the needs of individual industries, all free of charge.

All-State's technical training program is divided into three parts. Three-day accelerated courses are offered for practical workmen. An intensive week long course is also offered for welding, brazing and soldering salesmen. The third phase of All-State's program is a flexible series of technical demonstrations and lectures given to acquaint welding, brazing and soldering users with the latest information for their particular industry.

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GRIPCO TOPLOCK NUT
One piece all metal.



GRIPCO CLINCH NUT
With or without self-locking threads. Hex collar prevents turning when torquing bolt.



GRIPCO PILOT-PROJECTION WELD NUT
With or without self-locking threads. Centering collar positions nut and protects threads from weld spatter.

You get these
"extras" when
you specify

GRIPCO®

FASTENERS—

Service — 40 sales representatives all over the country for prompt, fast service.

Reliability — Quality controlled by the oldest established lock nut manufacturer in the U.S.

Stock — Large inventories to ensure out of stock delivery on all catalogued items.

Speed production and lower costs on your products with this GRIP NUT family of GRIPCO FASTENERS. Qualified fastener engineers are available for consultation on all your assembly problems. Consult the yellow pages in your phone book under "GRIPCO" for the one nearest you.

Other Gripco Products:

- Brass Toplock or Centerlock nuts.
- Miniature weld and clinch nuts, with or without lock.
- Toplock and Centerlock Hi Nuts.
- Standard Semi-finish full and jam nuts.
- Stainless Steel lock, weld and semi-finish nuts.
- Cold formed special nuts or parts to print.

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GRIPCO CENTERLOCK NUT
Locking feature in the center for fast feeding. Can be applied from either end.



GRIPCO COUNTERSUNK WELD NUT
With or without self-locking threads. Countersink protects threads from weld spatter.

GRIP-NUT COMPANY

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Phone: South Whitley 723-3111

Subsidiary of Heli-Coil Corporation,
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For further information contact Lee S. Wade, general sales manager, All-State Welding Alloys Company, Inc., 249-55 Ferris Ave., White Plains, N.Y.

CHAINVEYOR EXPANDS DISTRIBUTION

Equipment for Industry, Brooklyn, N.Y., and Earle C. Call & Associates, San Francisco, Calif., have been named distributor representatives on the east and west coasts, by Patrick T. Rauhen, president of Chainveyor Corporation, Los Angeles.

LAWSON JOINS CLARK BROS. SALES



Clark Bros. Bolt Co., Milldale, Conn. manufacturer of industrial fasteners, has announced appointment of Edward A. Lawson to handle company sales in New York state. A graduate of the University of Connecticut who has served several years in the company's home plant sales department, Lawson will make his home in central New York.

CONFERENCE REPORTS ON USSR AUTOMATION

A team of experts, recently returned from the Soviet Union, reported on Russian achievements in automation in September at the Joint Automatic Control Conference at Cambridge, Massachusetts.

The group, which returned from Moscow on July 2, presented "an analysis of the present status and future trends" of Soviet automatic control theory, scientific and industrial applications and control system components. Chairman of the event, at the Massachusetts Institute of Technology, was Harold Chestnut, first President of the International Federation of Automatic Control. Over 500 attended.

MISS WELDOR OF 1960 is Juli Reding, rising young star of television and the movies, according to Eutectic Welding Alloys Corp., sponsors of the annual competition.

Blonde Miss Reding (39-23-35) is also a writer, interior decorator and law student. Her TV credits include guest appearances with Red Skelton, Steve Allen and George Gobel, and roles on 77 Sunset Strip, Colt .45 and Richard Diamond. Her latest films are "Tormented", "Mission in Morocco" and "Why Must I Die".



SAAR, TERRY, NAMED TO NEW A-C POSTS

Appointment of G. A. Saar as general manager, mechanical departments, and of W. M. Terry, Jr., as general manager, electrical departments, has been announced by Allis-Chalmers Industrial Equipment Division. Saar had been assistant general manager of the Industrial Equipment Division. Terry, director of engineering coordination for Allis-Chalmers Industries Group since 1957, is now responsible for the operations of Norwood (Ohio) Works.

EVERY KIND, SHAPE, SIZE COTTER PIN

for any specific purpose
or general mechanical
use is manufactured by



Western Wire makes the largest and most complete line of cotter pins in the U.S. WW Cotter Pins are consistently accurate even in complicated shapes — designed and produced in strict accordance to specifications.

Write for prices and samples too, if wanted.

	WW COTTER PIN with chisel point, extended prong or chisel point, even ends
	WW CASTLE COTTER PIN to secure castellated nut
	WW SELF-LOCKING COTTER PIN where spreading space is limited
	WW TAPER-POINT COTTER PIN to align assembly for easy insertion

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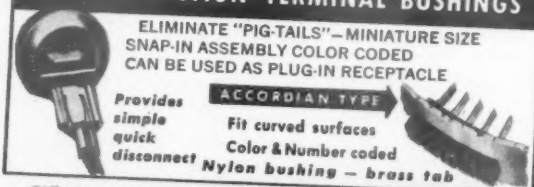
HEYCO Nylon STRAIN RELIEF BUSHINGS



The insulating bushing that anchors a cord set to an electrically operated machine or appliance.



HEYCO JUNCTION-TERMINAL BUSHINGS

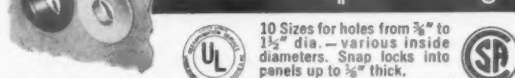


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SNAP-IN ASSEMBLY COLOR CODED
CAN BE USED AS PLUG-IN RECEPTACLE

Provides
simple
quick
disconnect

ACCORDIAN TYPE
Fit curved surfaces
Color & Number coded
Nylon bushing — brass tab

HEYCO NYLON Snap Bushings



10 Sizes for holes from $\frac{3}{8}$ " to $1\frac{1}{2}$ " dia. — various inside diameters. Snap locks into panels up to $\frac{3}{8}$ " thick.



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BUSHINGS OF
YOUR CHOICE

HEYMAN MANUFACTURING CO.

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HEYMAN — SAY HEYMAN

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Assembly and Fastener Engineering

GREGORY REPORTS RECORD SALES

Gregory Industries, Inc., Toledo, Ohio, reported record sales and earnings for the fiscal year ended April 30, 1960. Sales of Nelson stud welding and stud driving products and Bulldog concrete fasteners totaled \$7,814,063, a 16% increase over the preceding year's \$6,759,293. Net earnings were \$462,263, an increase of 38% over the previous fiscal year's \$355,282.

Earnings equaled \$1.31 per share on the basis of 352,494 shares outstanding, compared with last year's \$1.02 on 328,289 shares then outstanding.

ENGINEER TO DIRECT U. C. PURCHASING

The following changes in Union Carbide management were announced today by Howard S. Bunn, president of the corporation: Hermann K. Intemann was named director of purchases for Union Carbide Corporation, William H. Feathers was appointed president of Union Carbide Metals Company, and James R. Johnstone was made president of National Carbon Company.

Intemann, who has been president of Union Carbide Metals Company since 1957, joined Union Carbide in 1930. He is an alumnus of Stevens Institute of Technology with the degree of M.E.

KRUEGER ANNOUNCES PLANT EXPANSION

Expansion and modernization of plant facilities, together with the election of new corporate officers, has been announced by H. R. Krueger & Co., Detroit, as part of a long-range diversification program into automation equipment, reports R. B. Aspinwall, president.



ELLIS

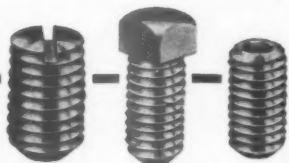


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exactly right for any job . . .
and you can get them **FAST**



Dependable delivery — ample production capacity assures that you get any order, large or small, on schedule.

Uniform high quality — modern equipment and methods and rigid quality control guarantee precision quality.

Advice of specialists — expert engineering assistance, backed by 80 years of experience, is available to help solve problems.



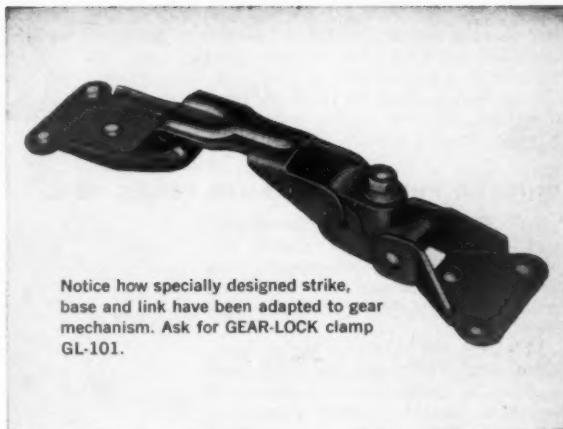
Moore set screws simplify design, purchasing, production. Send for price catalog.

MOORE
SET SCREWS

George W. Moore, Inc.
since 1880
91 Beaver St., Waltham 54, Mass.

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October, 1960



Notice how specially designed strike, base and link have been adapted to gear mechanism. Ask for GEAR-LOCK clamp GL-101.



For mounting on flat surfaces. Ask for Hook type clamp HR-1.

CHOOSE FROM THE LINE THAT GIVES YOU MORE TO START WITH!

With more to choose from, you'll probably find just what you need to start with. The Bassick line of clamps and fasteners includes hook, loop, hinge, springloaded and gear-lock types as well as many special duty clamps.

The *real* beauty of the Bassick line is its unusual flexibility. We frequently adapt one of our many standard clamps or the component parts to solve specific customer problems — save money and time. Send for catalog: Bassick Clamps and Fasteners. It may well help obtain better fastening for your containers.

THE BASSICK COMPANY,
Bridgeport 5, Conn. In Canada:
Belleville, Ont.

Q.14



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Formerly the Krueger-Barnes Corporation, the Detroit firm has elected F. T. Ellis, Jr. sales vice president. In line with the expansion, the company is currently establishing additional representation in the field—both in this country and in Europe. Most recent U. S. appointment is C. E. Dray, Rockford, Ill., who will handle sales and service of the Krueger line in Illinois, Iowa and Wisconsin.

CHICAGO PNEUMATIC NAMES PLANT MGR.

John Kacmarik has been named general manager of the Franklin, Pa., plant of the Chicago Pneumatic Tool Company. He succeeds H. E. Moore, retiring after 41 years with the company.

Kacmarik has been with the company since 1932 after graduating from Case Institute of Technology. His latest post was manufacturing control manager of the Utica, N.Y. facility.



REYNOLDS ORDERS ULTRASONIC WELDERS

A long range program to equip all of its aluminum foil manufacturing facilities with ultrasonic seam welding equipment was announced by Reynolds Metals Company.

Frank L. Eichner, general manufacturing manager of the firm's foil division, said a second foil seam welder had been ordered from International Ultrasonics, Inc., Rahway, N.J., in the first step to implement the program.

The equipment is installed on foil processing machinery to splice breaks, Eichner explained. At present, tape is used for splicing. The welder uses ultrasonic energy to produce joints in aluminum foil or other metals which maintain the strength of the parent metal, are uncontaminated, electrically conductive, and involve no changes in the structure of the metal.

GM INSTITUTE ADDS ELECTRICAL ENGIN.

Baccalaureate degrees in electrical engineering will be granted by General Motors Institute for the first time in 1963, James E. Goodman, chairman of the Institute's board of regents and vice president of General Motors, announced.

The school's regents voted to grant the electrical engineering degree in addition to the mechanical and industrial engineering degrees presently awarded. The five-year curriculum is directed toward three important areas of need for an electrical engineer in General Motors: product design, plant engineering, and process engineering.

More than 2000 students are enrolled in GMT's cooperative engineering programs. Approximately 3900 graduates are currently employed by General Motors.

ADHESIVE PRODUCTS ANNOUNCES EXPANSION

Commencement of a \$5,000,000 expansion program by Adhesive Product Corporation, New York, is announced by M. P. Medwick, president. First stage in the expansion program is the construction of a 23,000 square foot steel and concrete addition to the present plant. When completed, this completely automated plant will produce Visopox, a polymer which incorporates the features of rubber, epoxy resins and polyvinyl acetate.

PARKER SEAL PROMOTES TWO

George Meyer has been named manager of manufacturing for the Parker Seal Co., Culver City, Calif. He joined the company in 1959 after 12 years as general superintendent at Warner & Swasey, Inc. He will be responsible for facilities in four cities.

William Swan is serving as the new assistant sales manager. He was formerly sales representative in the Dayton, Ohio area.



18-8 and 316

STAR STAINLESS SOCKET HEAD CAP SCREWS

Smooth and Knurled Types, Coarse, or Fine Thread. Sizes 0.80 and Up. Splined and Flat Head, Nylok and Socket Set Screws.

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Assembly and Fastener Engineering



THE LONGEST SINGLE PIECE of graphite for its cross-section ever made is this 30-foot column measuring 12 by 14 inches on the sides. The 3700-pound giant was manufactured by National Carbon Company, Division of Union Carbide Corporation. Production required special manufacturing techniques, and new clamps had to be made to handle the long piece during the various processing steps.

LONG-LOK NAMES CINCINNATI DISTRIBUTOR

Long-Lok Corporation, Santa Monica, Calif., announces the appointment of the G & H Sales Company, Cincinnati, Ohio, as their sales representatives for Kentucky, Ohio, and Michigan.

HONEYWELL APPOINTS RESEARCH DIRECTOR

Appointment of Dr. Van W. Bearinger as director of research for Minneapolis-Honeywell Regulator Company and the promotion of two other scientists to the newly created positions of assistant research directors has been announced. Named assistant directors are Dr. John N. Dempsey and Edward E. Rexer.

continued

look into eyelets
your FASTENING

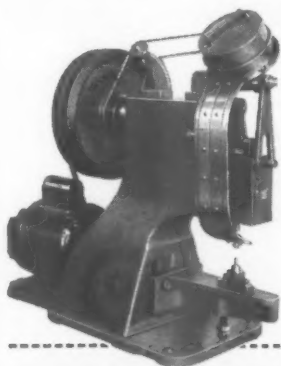


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EYELETING
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Manufacturers who introduce precision built Edward Segal eyeletting machines to their fastening jobs find they require less handling and production time over other methods—and the machines are complete with no adaptation necessary. Eyelets usually cost much less, and the fastening looks far better.

Depending upon your operation, these highly reliable machines can be supplied with varying degrees of automation. Feeding is simplified, and because of the Limited Travel Spindle (pat. pend.), even settings as small as .032" I.D. are possible with a minimum of tool breakage.

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Manufacturers of eyeletting machinery, special hoppers and feeding devices

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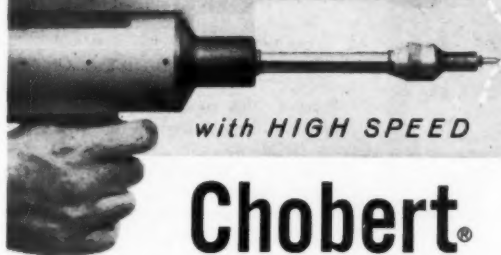
October, 1960

CUT COSTS ON BLIND

OR OPEN

FASTENING

with HIGH SPEED



Chobert®

AUTOMATIC RIVETING

The fastest blind riveting method known... gives uniformly excellent fastening every time. One man, even unskilled, easily completes rivet installation from one side of the work in either open or blind riveting applications in less than 2 seconds. Up to 2000 rivets an hour can be set on production line work.



Speeds production
— Cost is low

EASILY OPERATED... FAST... DEPENDABLE

The Automatic Chobert High Speed Riveting Gun holds a mandrel of up to 65 rivets, each automatically held ready for installation as fast as the operator can position the portable gun. Hand placing and bucking of rivets is eliminated... no finishing is required. Chobert simplifies blind or open fastening on vertical, horizontal or overhead surfaces, even areas normally considered inaccessible.

EVERY RIVET UNIFORMLY SET

Each rivet expands evenly, assuring uniformity of strength and vibration resistance, without distortion or marring sheet metal. Chobert aluminum or mild steel rivets are available in diameters from $\frac{3}{32}$ " to $\frac{1}{4}$ ".

The Chobert System is successfully used by leading manufacturers of appliances, industrial equipment, electronic components, aircraft, missiles and other sheet metal fastening operations.



WRITE TODAY FOR BULLETIN R-660

AVDEL

210 SOUTH VICTORY BOULEVARD • BURBANK, CALIFORNIA

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Bearinger has been associate research director since 1950. He fills a vacancy created about a year ago when Dr. Finn J. Larsen was elected a corporate vice president in charge of research. Bearinger, who joined Honeywell in 1950, is credited with sparking the development of the nation's first power transistor.

BRISTOL EXPANDS CHICAGO FACILITIES

The Chicago district office and warehouse of the Socket Screw Division of The Bristol Company have moved to 2040 N. Hawthorne Avenue in suburban Melrose Park, Ill. W. C. VanLeuven, socket screw sales manager, says the new facilities will provide expanded office and warehouse space.

M&T APPOINTS WELDING REGIONAL MANAGER



Otis H. Young has been named manager of the west central region for the Welding Products Division, Metal & Thermit Corporation. He will be headquartered at M & T's East Chicago facility.

Prior to this new assignment, Young was a welding salesman for the company in Milwaukee. He joined M & T in 1951 as a welding salesman in the Chicago district office. Previously, he held several positions in Chicago in the welding industry.

ENGINEERS MOVE UP AT ATRONIC

Ray A. Zuck has been named vice president and James A. Commins, product manager, at Atronic Products, Inc., Bala Cynwyd, Pa. Zuck will direct design and production of material handling system, Commins activities will be in market research, development and product sales. Both men started at Philco Corp.



HI-SHEAR CORPORATION's expanded plant in Torrance, Calif. now comprises 112,000 sq. ft. of building area on 9.5 acres. The newly-renamed fastener manufacturer also owns an adjoining 9 acres for future expansion, reports president George S. Wing.

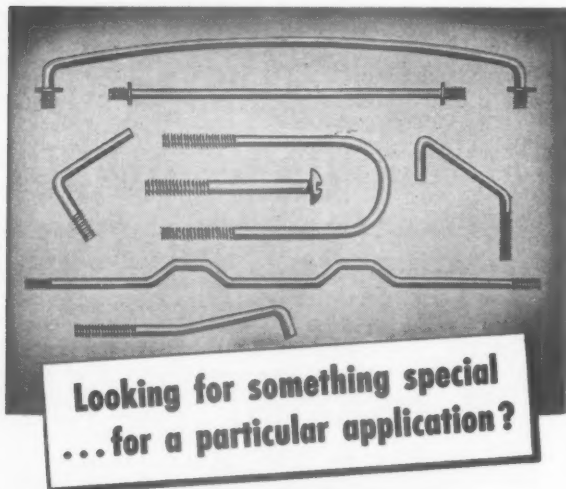
RANSOHOFF ADDS WEST COAST REP.

R. C. Wigger, executive vice-president Ransohoff Company, Hamilton, Ohio has announced the appointment of Earle C. Call & Associates as sales engineering representative in the San Francisco area.

MUELLER JOINS INDUSTRIAL SYSTEMS

Howard M. Sadwith, president of Industrial Systems Company, sales representatives for Industrial Washing Machine Corporation, Matawan, N.J. has announced the appointment of Charles Mueller as a sales engineer.

Mueller, a graduate of Newark College of Engineering, is presently attending Stevens Institute of Technology for his masters degree. He was previously with the Western Electric Company.



Looking for something special
... for a particular application?

...rely on Ohio Rod Products for—
SERVICE—QUALITY—UNIFORMITY

OHIO ROD makes Special Headed and/or Threaded Fasteners in short and long length — in short or long runs. Headed, Threaded, Collared, Bent, or Offset.

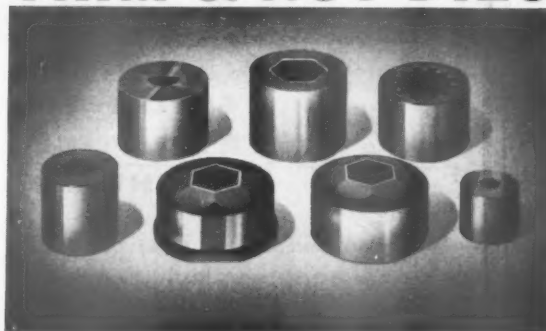
Send drawings or blueprints for quotes and literature.

OHIO ROD PRODUCTS CO., INC.

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TRIM & NUT DIES



Largest manufacturer of standard and special trim and nut dies for the fastener industry.

Standard tools are available from stock for bolt-makers, nut formers and trimmers.

"Trim your production costs with standard Howell Gear Trim Dies."

Prices for standard and special tools furnished upon request.



HOWELL GEAR CO., INC.

818 Fowler Street • Howell, Michigan
HOWELL 1076

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Assembly and Fastener Engineering

WEST GERMAN FIRM LICENSES REICHHOLD

Reichhold Chemicals, Inc. plans to manufacture vinyl acetate monomer under a license agreement which has been signed with Wacker Chemie G.M.B.H. of Munich, Germany, Henry H. Reichhold, president, announced.

The production of the chemical will be handled by a new plant which will have an initial capacity of 50 million pounds with planned expansion to 100 million pounds annually. Location of the new plant in the United States, to be announced later, will depend upon negotiations presently under way with several acetylene suppliers.

BROWN JOINS HUCK AS VICE PRESIDENT

Leo F. Brown has joined Huck Mfg. Co., Detroit, as vice president, manufacturing.

Brown brings to his new job experience spanning 27 years in engineering, manufacturing and management positions. Among the positions he has held are plant manager with Houdaille-Hershey and General Electric's Air Conditioning Division; works manager for Graham-Paige and National Electric Products Corp.; and vice president, manufacturing with Allied Products Corp. Prior to joining Huck, Brown had been works manager for Cleveland Pneumatic Industries.



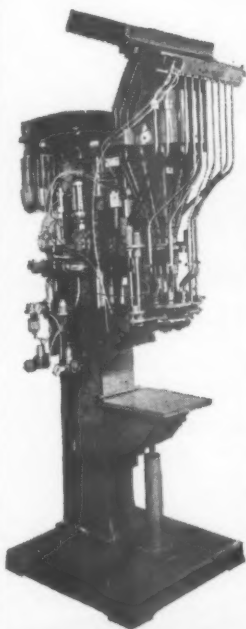
G.E. PLANS \$3 MILLION RESEARCH LAB

Plans for construction by the General Electric Company of a \$3,000,000 laboratory for the study of advanced manufacturing methods was revealed by H. B. Miller, vice president of Manufacturing Services.

The new facility will consolidate in one location six Manufacturing Services components now operating at various locations in Schenectady, N.Y. Construction of the company-wide facility will begin in early 1961 and it is scheduled for completion late the same year.

continued

**this machine will
drive up to
10 screws at
one time . . .**



... reducing assembly costs and improving quality. Built for high production jobs where a fixed set up is practical, this multiple spindle screw driving machine automatically feeds screws from a hopper and drives them to a predetermined torque. Evenly distributed pressure eliminates stresses caused by driving home one screw at a time. A simple sliding fixture positions work pieces accurately.

Machine illustrated shows application of multiple spindle screw driving to assembly of electric power drills.

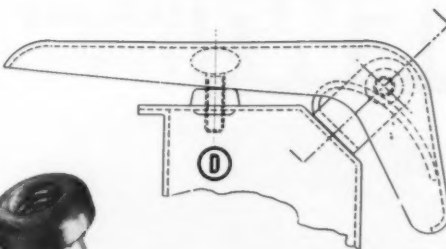
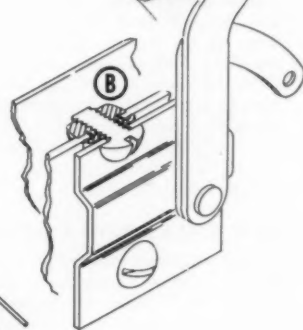
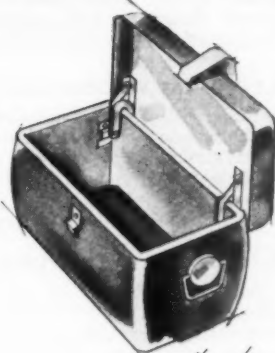
Send a sample of your assembly and a list of your requirements. We will be happy to show you how multiple spindle screw driving can be applied to your job.

COOK & CHICK COMPANY
2415 West 24th Street Chicago 8, Illinois

ON THIS PICNIC COOLER

TRS Perma-Nuts®

**DO FOUR
DIFFERENT
JOBS
... BETTER
- AT
LESS COST**



These new internally-threaded tubular rivets cut costs, bring new design freedom in countless applications. On this picnic cooler manufactured by Progress Refrigerator, there are actually six of them. One (A) is a nut plate and spacer for the front catch. Two more (B) are fastening fixtures for each hinge arm base. Another pair (C) serve as nut plates and pivot bearings for the spring-loaded latch. The sixth (D) receives the latch adjusting screw.

With these unique TRS fasteners, you keep all the advantages of threaded attachments, gain the simplicity, speed, economy of rivets . . . because they are automatically fed and set on standard high-speed machines, just like tubular rivets. Get the full story from your TRS man soon. Find him in the "Yellow Pages", or write us direct for fast, efficient help with your fastening and attachment problems.

**TRS® TUBULAR RIVET & STUD
COMPANY**
QUINCY 70, MASSACHUSETTS

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"The answer to foreign competition is not in reducing living standards, but in improving our productivity and our products," Mr. Miller said. "And that's exactly what laboratories like this are set up to do."

The new structure will contain 170,000 square feet of floor space. It will house modern offices, laboratory facilities, shops, classrooms and auditorium. Giffels & Rossetti of Detroit are architects for the project.

LEE JOINS WEDGELOCK FASTENER DIV.

WedgeLock Corporation announces the following additions and promotions at the executive level: Lewis C. Finkle has been elevated to the post of executive vice president. William Grant, general manager, has been elected a vice president. James H. Lee has come into the organization as sales manager of the Fastener Division.

F. F. HINKLEY PURCHASES SPEED-D-BURR

Forrest F. Hinkley, for the past 14 years with Aeroquip's Western Division, recently resigned as vice president and general manager. He has purchased the Speed-D-Burr Corporation, Glendale, Calif., where he will serve as president and general manager.

For 15 years Speed-D-Burr has designed and produced barrel-finishing equipment. Sizes range from tiny barrels to multiple units capable of deburring and finishing metal spars up to 110 feet in length.



NEW SALES MANAGER AT REVERE SCREW

Revere Screw and Rivet Co., Chicago, has appointed Harold Fish sales manager. Fish was formerly with Midland Screw Company, and has been in the fastener business for over 10 years.

NEW ENGINEERING FIRM IN CALIFORNIA



Formation of A. T. Parker and Associates, Hollywood, Calif., makes available application of electronic principles and devices in the solution of problems in non-electronic businesses, according to A. T. Parker, former chief engineer of Stoddard Aircraft Radio Company, Inc., Hollywood.

Manufacturing facilities are under the direction of Carlyle C. Moore, formerly manager of the Printed Circuit Division of Packard-Bell Electronics Co.

SCHWAN JOINS SCHENECTADY VARNISH SALES

Robert L. Schwan has been named product sales manager by the Schenectady Varnish Company, Inc.

Formerly affiliated with National Lead Company, Catalin Corporation of America, and Varcum Chemical Corporation in technical sales and sales management positions, Schwan now makes the Company's main office in Schenectady, N.Y. his headquarters.

COLTON NAMES KINSLEY CHIEF ENGINEER

Lewis H. Kinsley is the new chief engineer of the Arthur Colton Company, Detroit. Kinsley has been associated with Colton as chief engineer-packaging machines since he joined the firm early last year. Before that he had been vice president in charge of engineering and sales for Hope Machine Company of Philadelphia which was purchased by the Arthur Colton Company in March of 1959.



NEW! ENGLAND'S finest



Compact PNEUMATIC SCREWDRIVER by DESOUTTER

\$79.00
nonreversing
to
\$125.00
reversing

- 12 MONTH GUARANTEE
- PATENTED PORT-VALVE DESIGN
- REALLY SILENT RUNNING
- PROMPT SERVICE, PARTS

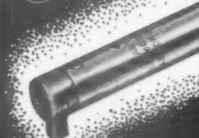
Write for **FREE** catalog!

NEWAGE INDUSTRIES, INC.

222 York Road, Jenkintown 23, Pa.

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TORQUE LEFT...



TORQUE RIGHT

With ONE Micro-Set Torque Tool!

Apco Mossberg's improved Micro-Set Torque Tool does both . . . torques left and right. Simple to set and stays set at 5 to 150 inch-pounds of torque. Releases Automatically at desired tension . . . and resets itself.

Compact and Versatile, Micro-Set is ideal for rapid precision assembly of electrical and industrial equipment, instrumentation — all close quarter tightening.

Several Sizes Available: 5 to 150 inch-pounds, 100 to 750 inch-pounds, 700 to 1600 inch-pounds, and a preset Midget type wrench for torquing in inch-ounces. Write today!

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215 Lamb Street, Attleboro, Mass.

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Assembly and Fastener Engineering

THOMSON ELEC. WELDER PROMOTES THREE



MOORE



GRANT, JR.



GRANT

Thomson Electric Welder Co., Lynn, Mass., announced the promotion of C. Dana Moore, John C. Grant, Jr., and George R. Grant to executive sales positions. This move, according to president R. P. Hedblom, complements Thomson's current program to further elevate marketing, sales and service efficiency, and is expected to further integrate field distributors and engineers with sales and production departments.

Moore advances to the position of sales manager, Grant, Jr., to assistant sales manager and George R. Grant becomes the new factory sales engineer.

PYLES REORGANIZES SALES DEPARTMENT

Pyles Industries Inc. of Detroit—A subsidiary of Kent-Moore Organization, Inc. has appointed C. G. Davis as sales manager—distribution and J. E. Flynn as sales manager—direct. The new sales organization will provide greater emphasis on field contact development and customer service.

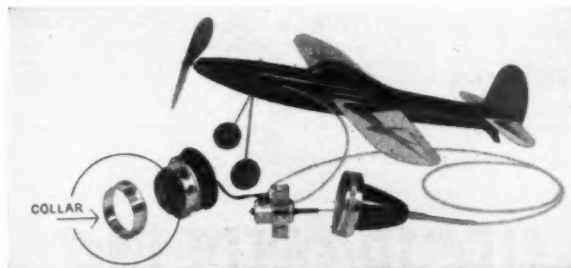
REICHOLD EARNINGS UP 18 PERCENT

Reichhold Chemicals, Inc., White Plains, N.Y. reported the highest sales and operating earnings in the corporation's history during a six-month period.

continued

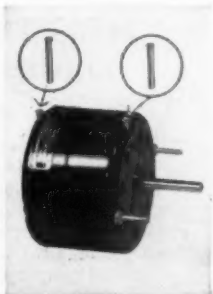
IDEAS for cutting costs . . .

ELIMINATE THREADING OPERATION. Barrel of a small keycase flashlight required separate threading operation to accommodate cap. Fabricated Metal Goods Division engineers suggested three indentations to replace female thread so aluminum barrel could be completely fabricated on our multiple-plunger presses—cutting out cost of second operation.



LOW-COST COLLAR. Toy maker needed a large flat-flange collar to act as stop and contact for switch and to conduct current from batteries to motor operating toy plane. Using experience in making eyelets, our engineers designed a precision aluminum part we could make on a multiple-plunger press. The part simplified assembly, served electrical and mechanical functions—had a very attractive price.

EYELET FOR OIL FEED. Motor manufacturer was making oil-feed tubes by cutting short lengths from seamless tube and flaring one end—and having some trouble in assembly with square-cut end. Our engineers designed a funnel-flange eyelet to the specified dimensions—with a radius on unflanged end to simplify assembly. Because we made the part on a multiple-plunger press, metal gage could be reduced. Total savings were very considerable.



Maybe we can develop cost-cutting ideas for you, too. We offer a complete design-engineering service based on long experience and specialized production equipment. Write for Booklet BG-5. Better yet, send a sample, drawing, or description of a part you need to produce at low cost (any metal, any finish) for an eye-opening quotation. Address: Anaconda American Brass Company, Waterbury 20-A, Conn.

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ANACONDA®

MULTIPLE-PLUNGER PRESS PRODUCTS

Anaconda American Brass Company

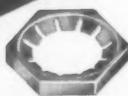
NEW STAMPED FASTENERS BY CREST PRODUCTS



WASHER NUT
One Piece



ACORN NUT



REGULAR NUT



WING NUT

Available in heat treated Spring Steel... in all popular sizes and finishes.

Crest specializes in custom building fasteners to meet your exacting, individual specifications.

WRITE FOR COMPLETE TECHNICAL DATA



CREST PRODUCTS, INC.
P. O. BOX 64, UNION, NEW JERSEY

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October, 1960

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107

INCREASE PRODUCTIVITY WITH NEW **BETA** WIRE & CABLE MARKERS!!



"We saved 500 man-hours using BETA Type 'Z' markers to code 200 industrial control panels. Our installers found ease of selection and quick installation cut wire marking time 40% with BETA markers," says E. L. Wolfe, Jr., Vice President, Wolfe & Mann Mfg. Co.



BETA Type "Z" markers—tight-gripping PVC sleeves—are designed for wires 0.110" to 0.460" in diameter.



BETA Type "S" markers—flat PVC markers and PVC-covered aluminum strapping—are designed for wires and cables over 0.5" in diameter.

Samples and a six-page catalog describing the new BETA marking systems are available—free—on request.

Territories are now available for qualified distributors and jobbers. Inquiries are invited.

Specialists in INSULOID® Fasteners & Harnessing Devices, & BETA® Cable Markers

ELECTROVERT INC.

124 East 40th Street, New York 16, N. Y., OXford 7-8396
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For torquing problems **USE** the

New "TITANTORKER" controlled TORQUE DRIVER

"TITANTORKER" makes controlled power torque available for a variety of torque uses—at low cost.

When desired torque is reached an audible signal is given as the internal driving balls are forced out of their sockets and overrun.

EASY ADJUSTMENT—For increased or decreased torque, "TITANTORKER" can be simply adjusted with an Allen wrench.

"TITANTORKER" can be used with any motive power except impact wrenches. Is ideal for most controlled power torque problems due to ease of adjustment and maintenance.

Available in 4 sizes in maximum torques from 75" lb. to 225' lb., with Female Adapters in driving head and Male Adapters on torque base.

Write for details and prices



World's Largest Producers Of
Stud Drivers And Pullers

TITAN TOOL CO.

47 MAIN ST., FAIRVIEW (ERIE COUNTY), PA.

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First-half operating earnings in 1960 were 18% above the same period last year and total sales during this period were 5% ahead of the first six months in 1959.

Henry H. Reichhold, president, stated that the corporation's total sales amounted to \$49,769,000 with total earnings of \$1,740,000, including \$335,000 in capital gains, which was equalled to 47 cents per common share during the first six months of 1960. During the same period in 1959, total sales amounted to \$47,412,000 with total earnings of \$1,754,000, including \$558,000 in capital gains, which was equalled to 55 cents per common share.

BUEHRING JOINS POP RIVET, WEST COAST



Charles F. Buehring has been appointed district representative for the South Pacific region by the Pop Rivet Division of United Shoe Machinery Corporation. He will report directly to the district manager, John M. Jurist.

Buehring was formerly associated with Huck Manufacturing Company as assistant to the Western Division sales manager of the company.

DUNCAN JOINS GORHAM ELECTRONICS LAB.

Kenneth Duncan was appointed staff scientist of the Gorham Electronics Laboratory announced Wilbur H. Norton, president, Gorham Manufacturing Company, Providence, R.I.

Duncan comes to Gorham from Raytheon Mfg. Co., where he was section head of engineering and antenna design and analysis department. Previously, he was with Gabriel Electronics Division as chief electronic engineer. He had earlier been a design and development engineer for General Electric.



**KRIMPTITE*
INSULKRIMP*
VERSAKRIMP*
VIBRAKRIMP*
AVIKRIMP***

*Trade Mark



ETC INCORPORATED
990 E. 67 St., Cleveland 3, Ohio

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Assembly and Fastener Engineering



SIX DISTRICT OFFICES of the Armstrong Cork Company's Industrial Division have been named to the Division's "Twenty Percent Plus Club", an exclusive club for offices exceeding their sales quotas by 20 percent or more. Awards were presented by E. W. Jones, Field Sales Manager (center), to (left to right): J. G. Ostertag, St. Louis; D. M. Smith, Philadelphia; F. R. Trenor, New York; P. H. Fiebigler, Los Angeles; John Mininall, Detroit and R. L. Fels, Chicago.

HARPER APPOINTS PITTSBURGH MANAGER

Appointment of Robert Baldwin as district manager in the Pittsburgh, Pa., area for The H. M. Harper Company, Morton Grove, Ill., was announced by Earle A. Channer, vice president in charge of sales.

Prior to joining the H. M. Harper Company, Baldwin served for more than 20 years as a member of the sales staff of the G. H. Tennant Company, Minneapolis.

ELECTRO PLATERS ELECT WESLEY PRESIDENT

At the Annual Meeting of the governing council of American Electroplaters' Society, Inc. in Los Angeles, Dr. W. Andrew Wesley of Plainfield, N.J., an executive of The International Nickel Company, was unanimously elected national president for 1960-1961. He succeeds Ralph D. Wysong, Studebaker-Packard Corporation.

continued



SPIROL PIN comes in Medium, Light and Heavy Duty...

In a majority of applications, the Medium Duty SPIROL PIN satisfies all requirements, and gives cost savings through increased production by easier and faster insertion. Application in materials too soft, brittle or thin for heavier spring pins is possible with Medium and Light Duty SPIROL PINS.

Miniature Diameters... SPIROL PIN is the only spring pin available in $\frac{1}{32}$ " to $\frac{1}{8}$ " diameters as large as $\frac{3}{4}$ ".

Uniform chamfer on ends of every SPIROL PIN... insures ease of insertion, without hole damage or distortion.



Write for free **TECHNICAL DATA MANUAL**. Free samples for specific applications.

C. E. M. COMPANY

30 SCHOOL STREET, DANIELSON, CONN. • PRescott 4-8571

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October, 1960

an ACCURATE SPECIALTY!

WELDING SCREWS

We manufacture a complete line of projection welding fasteners from either Special analysis low carbon steel or stainless steel.

When it comes to welding screws, spotwelding screws and welding pins, send us your requirements... they are an **ACCURATE SPECIALTY!**



KNOW YOUR SOURCE
... make sure it's **ACCURATE!** We are manufacturers of a complete line of standard and special metal fasteners... screws... nuts... bolts... washers... rivets... one source for all of **YOUR** fastener requirements. Our high speed production facilities enable us to serve you better, competitively priced... with an inventory available for delivery from stock.

WRITE NOW
... an "ACCURATE" sales engineer is in your area, ready to serve you.

Have you received our
NEW product brochure?

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MANUFACTURERS

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SCREWS NUTS BOLTS WASHERS RIVETS
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CHICAGO 18 • ILLINOIS

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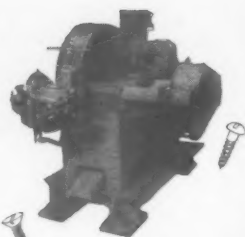
BEHR

FASTENER AND WIRE FORMING EQUIPMENT

complete plant layouts or departments

BEHR MACHINERY & EQUIPMENT CORP.

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COLD HEADERS
THREADING MACHINES
WIRE DRAWING MACHINES
WIRE STRAIGHTENING UNITS
SPRING MAKING MACHINES
WIRE CUTTING MACHINES
NAIL MAKING MACHINES
BARBED WIRE MACHINES



WRITE FOR CATALOGS!

Also — a complete stock of new and used Machine Tools and other equipment.

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Joining the staff of the Research Laboratory of The International Nickel Co., Inc. at Bayonne, New Jersey, in 1926, Dr. Wesley was made head of the chemical research groups working on electroplating and corrosion in 1933. He became assistant director of the Laboratory in 1939 and was promoted to Manager in 1954. He is author of some 40 publications, these mainly in the fields of nickel plating, metal cladding and corrosion.

NAT'L LOCK ADDS SOUTHWEST TERRITORY

National Lock Company has named Carl Pumilia, formerly of the Rockford, Ill., home office, as field representative in its new sales territory headquartered at Fort Smith, Ark. His territory includes Arkansas, Oklahoma outside of Tulsa, and western Tennessee.



PUMILIA



COWAN

In addition, Medalist sales division of National Lock, specializing in residential hardware, has named W. E. Cowan as its representative in a new territory headquartered at Fort Smith.

HAMILTON PROMOTED AT FASSON

Robert G. Hamilton has been appointed to the newly created position of market development manager for Fasson Products, Painesville, Ohio.

Hamilton will be responsible for coordinating research and development of new products, and in establishing new markets for Fasson, a leading manufacturer of self-adhesive papers, foils and films. Hamilton was formerly industrial products sales manager at Fasson. Previously, he was assistant sales manager for the Wurlitzer Company, and manager for radio sales at Sylvania Electric.

JACK NUT

The Only Blind Fastener Which Grips Any Material From 0" To 3/4" Thick

The Jack Nut cuts cost, speeds assembly, solves hitherto impossible fastening problems. Can be used as a rivet and/or blind fastener. It's versatile, easy to use and no special tools are needed.

The only blind fastener with threads which grips any material from 0" to 3/4" thick. Needs only 1/2" expansion space. Allows holes to be fashioned before, during or after fabrication. Hole size is not critical and special type of hole is not necessary.

Made of quality steel, cadmium-plated. Grips evenly on rough as well as smooth surfaces. Provides vibration-proof assembly. Weight-carrying capacity is limited in most cases only by strength of the material in which used.

Sold By Wholesale Hardware, Electrical Wholesale & Industrial Supply Distributors

MOPLY CORP.
230 J N. 5th St., Reading, Pa.

EASY TO INSTALL

- Insert Jack Nut into hole. Needs only 1/2" expansion space.
- Run in screw to collapse spider anchor backing by exerting pull on thread.
- Jack Nut now is installed and ready to receive attachment screw.

SPECIFICATIONS

CAT. NO.	CAP. DIA.	CAP. THICK.	BODY DIA.	O'ALL L'GTH	THREAD	MAX. SPREAD
4-S, JN	15/32	3/64	9/32	9/16	6-32	43/64
4-L, JN	15/32	3/64	9/32	3/4	6-32	43/64
* 6-S, JN	17/32	1/16	3/8	11/16	10-24	25/32
** 8-S, JN	5/8	1/16	27/64	3/4	1/2"-20	13/16

S for 0" to 3/4"; L for 3/4" to 3/2"
* 8-32 & 10-32 threads available
** 10-24 & 12-24 threads available
NOTE 4-S, JN & 6-S, JN also available in brass

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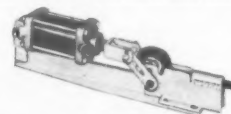
NOW! KNU-VISE GIVES YOU PUSH-PULL CLAMP CONTROL



P&P-1200
Hand Push-and-Pull Clamp



P&P-1200
Hand Push-and-Pull Swivel-Base Clamp



AOP&P-1200
Push-and-Pull Air-Operated Clamp

WRITE TODAY FOR COMPLETE INFORMATION

Push the handle! Pull the handle! It makes no difference—the new Knu-Vise clamps by Lapeer give you uniform clamping of parts. That's real performance! Look at these features—

90° handle motion produces lock of plunger for push or pull without resetting of handle. Handle is reversible. Plunger guided by two widely separated, hardened steel bushings for accuracy in motion and minimum wear. Built-in deflection provides uniformly tight clamping of parts with normal variation in thickness. Swivel base model provides 90° total change in direction of plunger motion. The air (or oil) operated model, AOP&P-1200, produces approximately 4 1/2 times the clamping force with 85 p.s.i. than the cylinder would alone. Failure of air (or oil) pressure does not permit reverse motion of plunger, thus not affecting clamping force.

All parts easily replaceable.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS LAPEER MANUFACTURING CO.

3070 DAVISON ROAD
LAPEER, MICHIGAN

WESTERN DIV.: PECK and LEWIS CORPORATION
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AVERY



COLLINS

Marbon Chemical Division of Borg-Warner Corp., Washington, W. Va., has appointed Elmer J. Collins as product applications engineer and John M. Avery, technical sales representative in Indiana. Collins rejoins the company after 18 months in Turkey for the

Tumpane Co. Avery will represent Cyclocac plastic resin.

PHILCO DIV. APPOINTS ENGIN. DIRECTOR

Joseph Robert Lewis has been named director of engineering for the Sierra Electronic Division of Philco Corporation.

A veteran of 14 years service with Philco, Lewis will take charge of all engineering and design activities at the division's offices. These facilities are currently undergoing expansion to more than double their physical size.

TENNESSEE EASTMAN MARKETS OVERSEAS

The marketing organization for Tennessee Eastman Company, manufacturing divisions of Eastman Kodak Company, is being expanded through a recently formed International Division.

The new Eastman marketing division will be responsible for the sales and service of fibers, chemicals and plastics manufactured by Tennessee Eastman and Texas Eastman in all countries except the United States and Canada.



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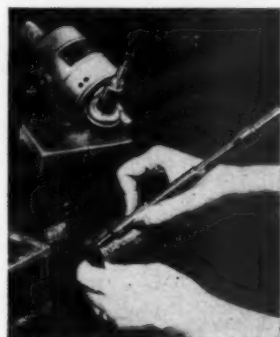


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The International Division, James C. White and L. K. Eilers announced, is under the direction of Henry L. Ford as general manager. Guy A. Kirton, formerly sales manager of ECPI's Chemical Division, has been named assistant general manager.

BROEHAN WINS BOWMAN'S SALES AWARD



Salesman George Broehan of Bowman Products Co., Cleveland, has been named winner of C. F. Devine Award, named in honor of Bowman's president.

Broehan, of Sacramento, Calif., was judged as having contributed the most for himself and the company's over-all progress during the past year.

The award goes to one of 11 nominees each year. In five of his 12 years with Bowman Products Company, Broehan has written more than \$100,000 worth of business.

APPOINTMENTS AT TOWNSEND COMPANY

Three executive appointments have been announced in the Cherry Rivet Division of Townsend Co., Santa Ana, Calif. Donald J. Sauser, formerly a service engineer, has been named engineering manager, technical sales and service. Before joining the company he was research engineer, Fastening Section, for Boeing.

Richard A. Villacres is the new sales manager in charge of Cherry lockbolts for shipbuilding and railroad operations. He comes from Huck Mfg. Co. R. E. Crowley, associated with Townsend since 1952, was made sales manager in charge of commercial blind rivets.

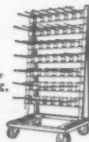


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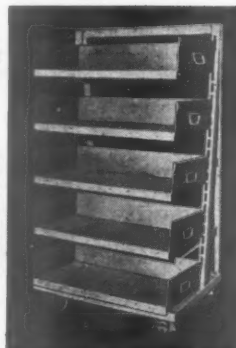
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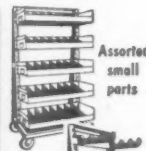
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CLUTZ NEW KODAK A&D ASSEMBLY SUPT.

Walter A. Erickson, superintendent of assembly for Eastman Kodak's Apparatus and Optical Division, has announced his retirement after more than 40 years with the company. Charles W. Clutz has been named to succeed him.

Clutz will be responsible for production assembly activities at the division's three plants in Rochester, N.Y.—the Camera Works, the Hawk-Eye Works, and the Lincoln Plant. He joined the Hawk-Eye Works in 1934 as a draftsman in instrument design. He was placed in charge of government instrument assembly in 1942 and instrument engineering in 1945. Clutz became superintendent of manufacturing for the Hawk-Eye plant in 1957.

MAYTAG PROMOTES TWO ENGINEERS

Rodger Blyth has been promoted to the newly-created position of technical assistant in the Maytag Company's research and development division. Donald Sexton has been named to succeed Blyth as a project engineer. *continued*

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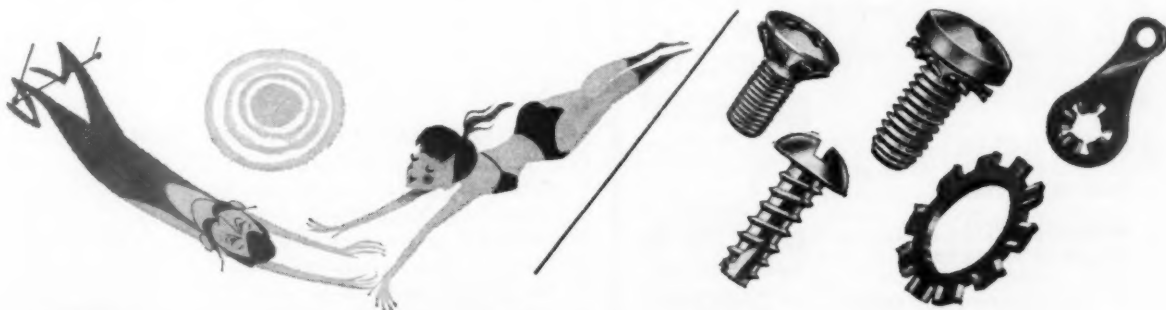
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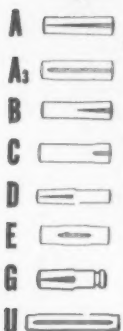
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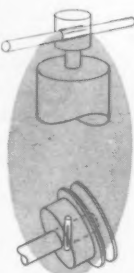
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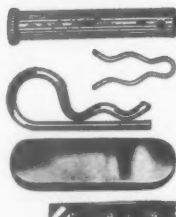
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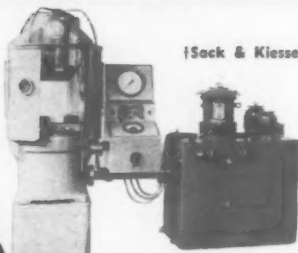


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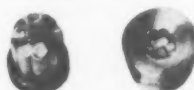


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Blyth will coordinate activities of the division's advance design group, chemical laboratory, home economics section and testing facilities. Sexton will serve as project engineer for the combination washer-dryer group. Blyth joined Maytag's research division as a design engineer in November, 1953, and was promoted to a project engineer in April, 1956.

CAMBRIDGE THERMIONIC ADDS TO STAFF

William G. Nowlin has been added to the sales engineering organization of Cambridge Thermionic Corp., Cambridge, Mass., as regional sales manager. He primarily will cover New England and the East Coast.

Nowlin who was previously with RCA Communications Division, Boston, has been a sales engineer for E. S. Vose Co. and material control coordinator for Raytheon Mfg. Co.



TAUBER JOINS TOWNE ROBINSON



Andrew Logan, president of Towne Robinson Nut Company, announces the appointment of Joel D. Tauber to the position of secretary. Tauber graduated from the University of Michigan Law School with a Juris Doctor Degree. He also holds a Bachelor of Business Administration Degree from the same institution.

WHIRLPOOL CALLS FOR BETTER MARKETING

"The home laundry industry did a poor selling job in the Fifties . . . and we must beat the predictions for our share of the market in the Sixties or we are going to be in trouble."

To support this statement, Jack D. Sparks, vice-president of RCA Whirlpool appliance sales for the Whirlpool Corp., told the annual convention of the American Home Laundry Manufacturers Assn. that automatic washers have been sold to only 50% of potential buyers, dryers to 17.8% and combination washers-dryers to only 1.6%. By contrast, Sparks said, both the range and refrigerator markets are more than 97% saturated.

FASTENER SPECIALIST JOINS FIDDLER

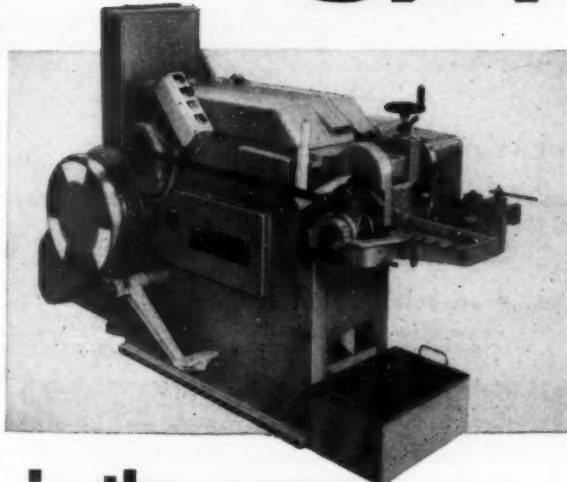
T. E. Fiddler, president of T. E. Fiddler Associates, manufacturers representatives, Birmingham, Mich., announced the appointment of William H. Farrell as sales representative. Prior to his appointment, Farrell spent four years with the sales department of Fastex, Inc.



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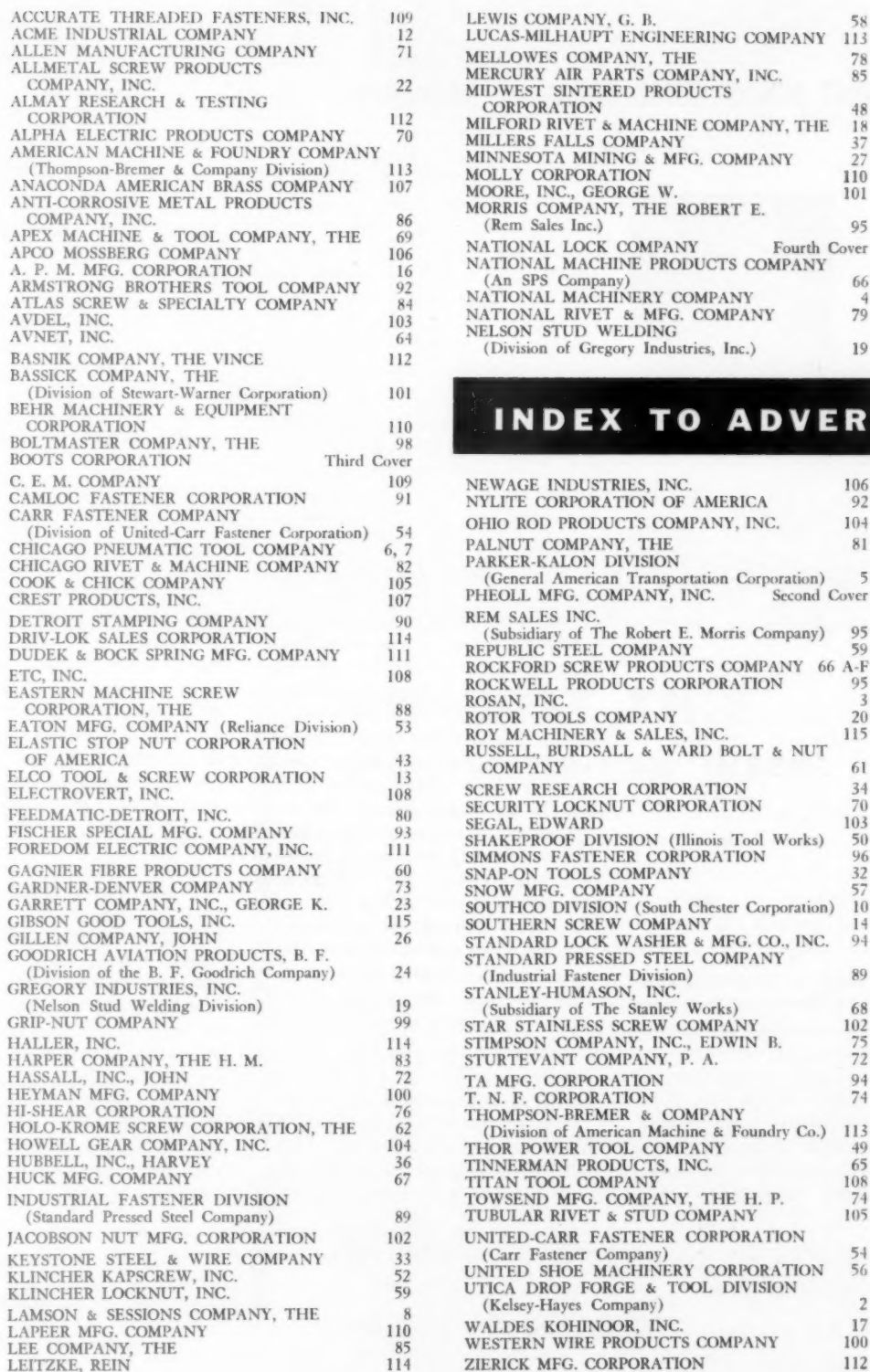
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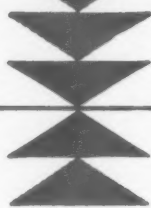
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ONE LAST WORD

EVERYONE NEEDS SOME FORM OF RESEARCH



say, "that sort of thing is too costly and too involved." This is only partly true; no medium-sized company is expected to invent perpetual motion or develop research projects leading to eternal life. But does this mean they should not engage in some form of research?

Three major obstacles block the research activities of medium-sized companies: a natural reluctance to spend money; not knowing what to research; and the cost of research.

Some companies are reluctant to spend money for anything—new equipment, new methods, top grade personnel or research. Their answer is that research is not measurable and is but a dignified form of gambling. They further apologize for their stand by saying their business is not one which needs new products. They prefer to let others do it and benefit without spending their money. While some manufacturing companies have a legitimate excuse here, others are merely parasites. A few are even dishonest enough to appropriate the results of others. However this may be, it is closely allied to the fact that many companies are not sure of what they should research.

Research, like a woman, wears many faces. You may want your research to develop a better, or a newer product. You may want to discover basic, underlying truths which will help your customer use your product to better advantage.

Let us say this research is outward-directed. Research can also begin at home, or be inward-directed, i.e. research into methods of manufacturing, or into the field of value analysis. You can research into assembly operations to determine whether your methods are the most economical which can be found. What about market, sales, merchandising research, to enable you to sell more and better and discover new uses for your products. The list is endless.

And finally, the cost. This is often much less than anticipated. In the major cities are many contract research organizations who work on a slight profit margin and who can frequently supply contract research work cheaper than you can do it inplant. Their fees are generally paid a hundred times over by their benefits to you. Remember, you don't have to undertake vast multi-million dollar projects.

Economically and technologically the world is catching up, and in many instances, has already surpassed the U.S. While improved technology, spurred on by research, is certainly not the only answer to our mounting problems, it is important in this respect: let us not lose out because the other fellow has a better product which we were too lazy or too stingy to develop. This we can avoid, and should. Research is an important weapon in the struggle for markets and customers. Use it, but do so wisely.

Many medium-sized companies shiver when research is mentioned. The subject is too vast for them, conjuring up visions of hundreds of scientists experimenting patiently with test tubes and expensive equipment developing solid fuels, new super alloys and weird mathematical formulae. "We're small companies," they

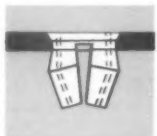
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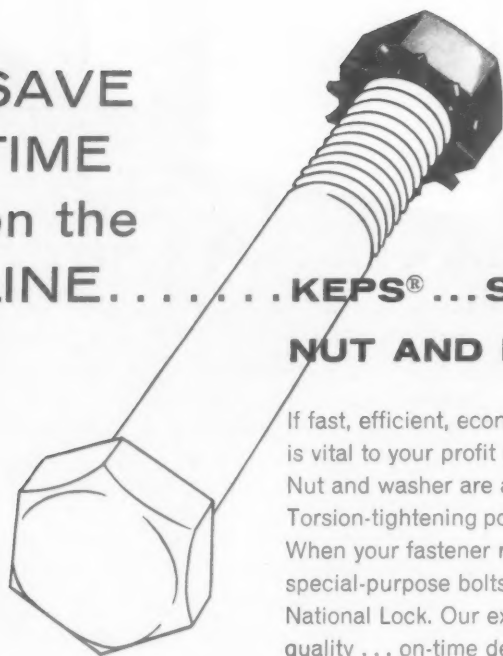
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